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August, 1924

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Still handles 100 yards an hour

You want to know how much the crane you buy will handle as well as how much it costs. After all a crane's output, its years of dependable service and its resale value are what really determine its cost.

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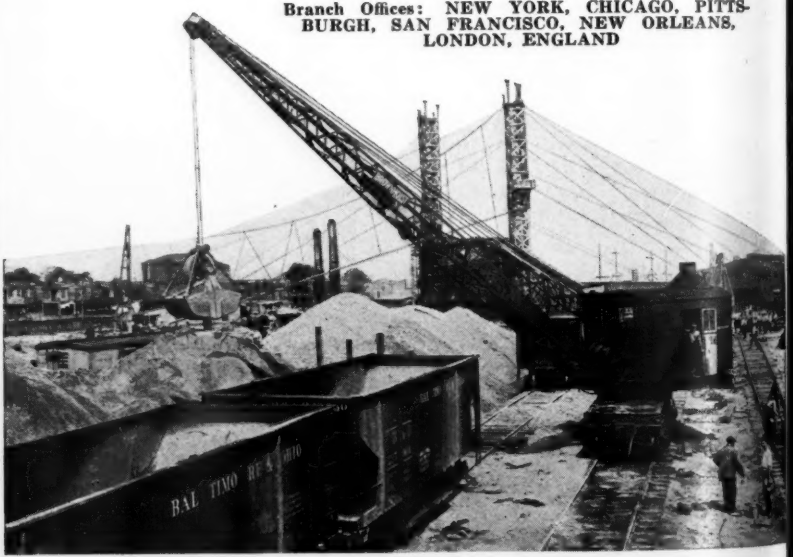

BROWNHOIST

MATERIAL HANDLING MACHINER

Pit and Quarry

A Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals

VOL. 8 CHICAGO, ILL., AUGUST, 1924 NO. 11

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The Barber-Greene Permanent Conveyor which handled 400 tons of washed and screened gravel in 10 hours for the White Marsh Sand & Gravel Co.

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Portable Belt Conveyors — Self Feeding Bucket Loaders

Coal Loaders . . Automatic — Ditch Diggers . . Coal Feeders

Pit and Quarry

Vol. 8 Chicago, Ill., August, 1924 No. 11

Risk and Waste Retard Industry

IT IS of great importance to the future of industry that a solution be found for two retarding factors, risk and waste. If industrial risk could be decreased and undue waste eliminated, we might reach a full realization of our productive capacity. The producer is not afraid of low prices if he is aware of them. A sudden fall in profits or rise in prices of cost goods, however, may absorb the margin of profit. If prices of labor and material exceed the price of the product, the producer faces ruin. It is this element of risk which is the grave problem

An idle plant indicates bad economy. Labor has been expended in its construction; capital has been invested in its equipment. Its productive possibilities are lost when they should be bringing greatest returns to the producer and workers.

Recent years have brought a great increase in our productive capacity. We are entering a period of still greater possibilities. There are three reasons for this. A large amount of the accumulated capital of the last two decades has gone into additional productive equipment. This increase in equipment has increased the productivity of the workman. Then there has been great improvement in the kind of equipment provided. Improvements in labor saving machinery have been constantly increasing. And last, scientific management has brought a vast improvement in methods of directing labor and utilizing equipment.

The possibilities of this country when its full productive capacity is ascertained are enormous. This was illustrated during the last war when we devoted fifteen billion dollars of our products to the war and lived more comfortably as a people than ever before. That figure was unthinkable before 1914. It is obvious that we are now letting much of our productive capacity run to waste through idleness. Partial unemployment and partial production are wasteful.

Decline in output following a period of falling prices will mean decline in profits, decline in capital, and decline in wages. To prevent decrease in production is the problem. Production creates demand. There is an enormous amount of unsatisfied demand which is forthcoming. What retards production is not lack of demand but waste and risk.

Accurate information regarding the purchasing power of the people and regarding wage scales would be of value. All money paid in wages becomes the resources by which the product is purchased. More statistics are also needed in regard to supplies of raw materials and resources in general. Prospective output must be estimated so that plans may be made accordingly. In other words, a study of the entire economic situation with the aim to increase production and to increase demand would be helpful. This would tend to safeguard both the producer and the wage earner.

Semi-Monthly Publication

COMMENCING October, 1924 PIT and QUARRY will be published on the first and the fifteenth of each month. This change is necessary to keep pace with the rapid growth of the non-metallic industries and to accommodate a more active and extended editorial policy.

The enormous amount of interesting and valuable material which is available for our readers demands more space than monthly publication allows. Rapid developments in the field necessitate more frequent treatment which will be possible under semi-monthly publication.

G. B. Massey Joins Pit and Quarry

MR. Geo. B. Massey has joined the staff of PIT AND QUARRY as Associate Editor. Mr. Massey has long been known to our readers as a specialist on problems of design and operations in the pit and quarry field. He will contribute articles of a rather technical character on questions of vital interest to every reader. Through the complete distribution of PIT AND QUARRY the entire field may benefit by his broad knowledge and experience.

Mr. Massey graduated from Sheffild Scientific School of Yale University in 1895. His experience includes twelve years with Bucyrus Company and several years of practice as a consulting engineer on problems of handling and excavating non-metallic minerals. During the Spanish-American War, he was Engineer Officer in the U. S. Navy and during the World War, a lieutenant in the U. S. Navy laying mines in the North Sea. He went around the world in 1922 in connection with excavation projects in India, the Malay States, Siam and the Philippines, Europe, Panama, Alaska, Cuba and Mexico. His book "Engineering of Excavation" had a wide circulation in our field. He is now vice president of Randolph Perkins Company of Chicago. Mr. Massey is a member of the American Society of Civil Engineers, American Society of Mechanical Engineers, Western Society of Engineers and American Association of Engineers.

The Activity of the Federal Trade Commission

COURT decisions, reversing Federal Trade Commission rulings, indicate that the Commission is not proving to be satisfactory to business. When the Commission was appointed, business men believed that it would be helpful, as an impartial investigator, in furnishing the public with information concerning trade situation and in standardizing a code of business ethics. The most valuable service that the Commission has rendered is in investigating trades, collating facts, and proffering such aid as logically comes from a mediator and guide.

Where the Commission has proved to be disappointing is in its assumption of the functions of prosecutor and regulator of business. Since its decisions are all in favor of its own authority, the rights of individuals have had to receive protection in the courts. In many cases the courts have reversed the decisions of the Commission. In one case which was a typical one, the Commission ruled that the manufacturer must sell all merchandise of like quality at one price to all consumers. A company which made different discounts to wholesalers and retailers was forced to submit the case to the Circuit Court of Appeals. The manufacturer was upheld, the court ruling that a company may choose its customers and set its prices.

Many similar cases have reached courts. Some cases are now pending. Court decisions indicate that there shall be no interference with business customs and practices if they do not tend toward monopoly, conspiracy, or fraud. Hence, the Commission is prevented from interfering with individual enterprise and the functioning of normal laws. The courts tend to allow free play to natural competition and to refrain from undue exercise of arbitrary authority.

Regulation of prices is not the business for which the Commission was created by Congress. Nor was it created for the purpose of directing the methods of manufacturers. The regulation of prices will be governed by the laws of competition. There is no need for arbitrary methods such as were used when one company was ordered to reverse its policy of refusing to sell to price cutters. The right of the company to adopt such a policy was sustained by the Supreme Court. Any producer who holds his goods at an arbitrary price will be speedily brought to the realization of his mistake by ordinary laws of competition. He will yield to the decision of such laws because they are inevitable and just. He will not willingly yield to arbitrary mandates issued from the Trade Commission if they appear to be unjust and out of harmony with generally accepted standards of equity and integrity.

Another Plant at Oxford, Michigan Producing Sand and Gravel

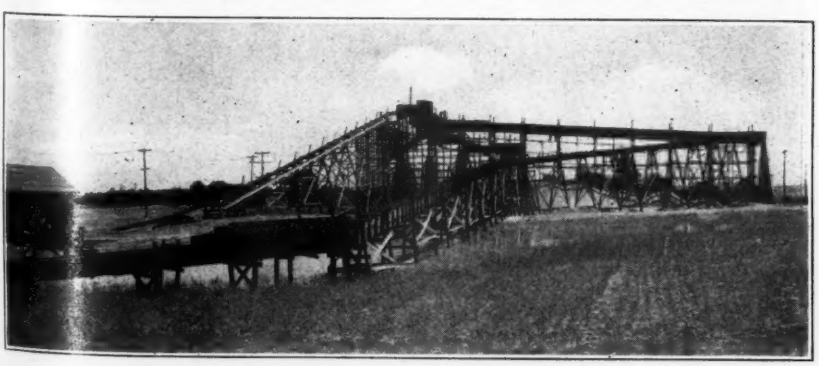
P. Koenig Coal Company Producing 100 Cars Daily Ground Storage, Tunnel and Belt Conveyor Adopted.

DETROIT is the center of the most important sand and gravel area in Michigan. The leading plants in this district are the Tecumseh Sand and Gravel Company at Tecumseh; the Ohio-Michigan Sand and Gravel Company at Chilson; the Standard Gravel Company at New Hudson; the Brighton Greenville Company at Green Oak; the Ward Sand and Gravel Company, the Fuller Becker Sand and Gravel, the Detroit Oxford Gravel and Stone Company, the United Fuel and Supply Company and the P. Koenig Coal Company—these last five at Oxford. These five at Oxford are spread out in fan shaped formation from Detroit. Five railroads, the Grand Trunk, Pere Marquette, Ann Arbor, Lake Shore, and the Detroit Toledo and Ironton carry the material into Detroit. The output is consumed largely by Detroit, Jackson, Monroe, Flint, Pontiac and Saginaw. The plants in the Detroit area including those not mentioned, produce an average of 2,000,000 cubic yards of material a year—more than all the rest of the plants in the state of Michigan combined.

Oxford, Michigan, undoubtedly holds the lead in sand and gravel dredging plant production. There are three electrically operated plants within a radius of one mile. The Ward Sand and Gravel Company was the first plant to be installed. This plant was described in PIT AND QUARRY of July, 1922. The second plant was that of the Fuller-Becker Sand and Gravel Company described in PIT AND QUARRY of July, 1923. The third and latest addition is the plant of P. Koenig Coal Company just being put into operation this season. Since these three plants operate in close proximity to each other and under identical conditions, they have profited by each other's experience.

The Koenig Plant

In the P. Koenig Coal Company plant the material is pumped direct from the pit to the top of the screening plant with the aid of a booster pump. This pump is located at the foot of an incline leading to the top of the plant. The deposit is of glacial origin and consists of sand and gravel of very high quality extending about 25 feet above water surface and to at least 40 feet below water surface. The deposit contains but very few large stones and very little cemented material or clay. The producers in this area are handling this material by means of a hydraulic dredge equipped with a jet agitator on the suction. This agitator not only breaks up the occasional streaks of cemented material or clay but stirs



General View of Screening Plant

General View of the Dredge and Screening Plant

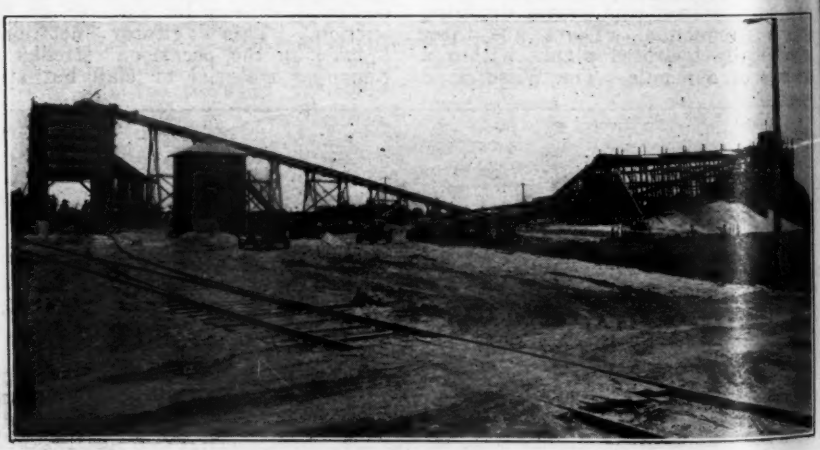
up the material and insures a steady flow to the pump suction.

Ample Storage Capacity

Considerable storage capacity is needed since the material is shipped by rail to Detroit. The P. Koenig Coal Company has adopted ground storage with a tunnel and conveyor belt underneath for loading into cars. The screening plant is about 70 feet from the ground to the highest point. This gives the desired storage capacity and permits sluicing of the surplus sand away from the plant. The total amount of this surplus sand may average as much as 50 per cent of the total volume of material handled. The high lift required from the water surface to the top of the screening plant combined with the friction losses through the discharge line makes it necessary to use a booster pump in addition to the pump on the dredge. The two pumps and the driving motors are electrical in every respect. The material is delivered through approximately 600 feet of pipe line with about a 75-foot lift above the water surface but the discharge line may ultimately be extended to 2,500 feet.

The Dredge

The dredge hull is of the square scow type 60x36 feet and gives ample room for equipment and working space. The dredging pump has a 15-



Loading Plant

inch diameter suction and discharge and is directly connected to a 500 horsepower 514 r. p. m. variable speed motor. The pump is of the latest type with manganese wearing parts and with water seals on both the suction and hub side of the pump. The suction is fitted with a jet agitator which is operated by a 6-inch pressure pump directly connected to a 100 horsepower 1800 r. p. m. motor. This pressure pump is also used for priming and for general purposes on board the dredge. A three drum hoist driven by a 15 horsepower 900 r. p. m. motor is provided for handling the suction and the dredge.

The screening plant is arranged to give three grades of gravel. The first screen for the coarse gravel is an ordinary flat screen while the screens for the medium and fine gravel are of the vibrating type. The discharge is first passed through a grizzly screen where the oversized material is taken out and delivered to a crusher and after crushing is elevated back to the screen. The water and sand are conveyed to settling boxes where the sand is graded hydraulically and discharged on the storage piles. The waste water with surplus sand is conveyed by means of sluiceways to proper spoil areas. Most of the sand and water are taken out immediately at the discharge through a perforated flat screen but sufficient water is retained with the gravel to assist in the subsequent screening.

The plant has been in operation a sufficient length of time to reach its full production. An output of 150 cars of material a day can be realized, and at the present time 100 cars a day are being produced. The gravel represents about 50 per cent of the total volume of material handled.

Equipment

The general layout of the plant and the installation of the equipment were under the immediate supervision of Mr. G. E. Bentley, plant superintendent and engineer. Mr. Bentley previously was connected with the Ward Sand and Gravel Company and the Buller-Becker Sand and Gravel Company. The entire equipment for the dredge together with the booster pump was supplied by the Morris Machine Works. The motors are all Allis Chalmers. The crusher is an Acme. The three drum boist is a Flory. A Sundh automatic electric control system is being used. Mead-Morrison car pullers have been installed. Mitchell screens and Armco pipes are being used.

Interior View of Dredge

The Oil Engine in the Gravel Pit and Stone Quarry

By L. V. ARMSTRONG, Engineer, Ingersoll-Rand Co.

WHETHER it is for belt driving conveyors, screens, hoists, and crushers, making compressed air, or producing electricity, the oil engine meets every power need of the gravel pit and stone quarry.

A prime mover, before it can receive consideration, must have demonstrated without question two characteristics—reliability and simplicity. After these points have been disposed of satisfactorily, and not before, comes economy of operation. Even if a machine could be designed and built which would make power at zero expenditure, it would have no value except as an engineering freak if it could not be counted on to deliver power whenever and for as long a period as required. It would be almost equally worthless if in order to obtain the unheard-of economy it had to be so complicated that only one out of a hundred operators could run it successfully.

The perfection of the direct or so-called "solid" system of fuel injection has changed the Diesel engine from a machine of considerable complexity and delicacy to one of great simplicity and durability. To obtain economies of .4 of a pound of fuel oil per brake horse power hour (equivalent to 19 horse power from one gallon), the 1000 pound, three or four-stage, injection air compressor with intercoolers, aftercooler, high pressure air piping, etc., is no longer necessary. The essential parts of a direct injection system are a simple plunger pump and an equally simple nozzle or fuel atomizer.

Of course, there must be the cylinder, piston and other running parts common to any reciprocating prime mover and according as the engine may be four or two cycle, there must be exhaust and intake valves or scavenging valves and a scavenging air pump. There are, however, no parts with which individually the average operator has not had more or less experience, and only reasonable intelligence is required to obtain excellent results.

There are several direct fuel injection oil engines built in the United States and an even greater number abroad. One of the successful builders in this field is the Ingersoll-Rand Company. The engines built by this company operate on the Price System, basic patents for which are owned by them. The 50, 100, and 150 horsepower sizes are horizontal, single cylinder engines and were especially designed for direct connection to air cylinders. They are also suitable for direct connection to pumps, generators, and general belting service. A vertical, multi-cylinder line of engines covers the range in horsepower from 105 to 1000. In laying out this vertical line, the operation of alternating current generators in parallel was the primary consideration.

The readers of "Pit and Quarry" will be particularly interested in the performance of a battery of three engines in the power plant of the San Antonio Portland Cement Company, San Antonio, Texas. Two of these engines are rated at 500 H. P. and one at a 1000 H. P. This company was the first to manufacture Portland cement west of the Mississippi. They are not, however, old fashioned but have always kept abreast of the times. The wisdom of this policy is evidenced by their phenomenal growth from the original plant turning out ten barrels per day to their present daily capacity of 1500 barrels.

The plant operates 24 hours a day, 6 days a week with a load factor of 90 per cent. Oil costs $1.60 per barrel and the owners estimate the fuel consumption per kilowatt hour at .52 pounds. On this basis, the total cost of power delivered at the switchboard should not exceed four-tenths per kilowatt.

On account of different load conditions, etc., it is not to be expected that this power cost can be duplicated in every case. It certainly behooves every user of power to investigate thoroughly the oil engine before undertaking any enlargement or extensive repairs of an existing power plant.

Water—Is It Your Friend or Enemy?

Written Expressly for PIT AND QUARRY by DWIGHT INGRAM.*

WHAT does water mean to your business? Is it an asset or a liability? For the industries to which this article is especially addressed, water is vital. These firms would be idle except for the rivers which make sand bars, gravel, cheap power or a free avenue of transportation.

This good friend, however, sometimes turns on us and damages or destroys us. "Too much of a good thing," an excess of that very water which we must have for operation, can wipe out a going plant in a moment. It is the job of insurance men to study the ways in which water acts as our enemy, and to distribute the burden of losses by collecting small premiums from all firms to indemnify the unlucky few which would otherwise be put out of business.

The knowledge of insurance which most manufacturers have, comes from the risks of fire and industrial accidents. The business man knows that a careless employee or a neighbor of low moral standing can cause a loss which must be covered by insurance. But more and more we realize that both the extent of these risks and the cost of insurance are almost entirely within the control of the individual plant superintendent. Fires do not start by themselves, nor are employees injured unless they are careless, or their superiors have made a mistake in providing the wrong machine or equipment or have given a wrong order. Each manufacturer practically determines the cost of his insurance by the degree of interest he takes in fire and accident prevention.

Water, however, is a different kind of risk. True enough insurance engineers are at work daily advising their clients how to relocate or otherwise change their plants so as to reduce the chance of loss. But generally the excesses of water cannot be controlled by engineering skill. They come as pure accidents, and a firm subject to them must either gamble on the chance of being put out of business or try to find protection through insurance.

Unfriendly water comes in many different forms. Sometimes the damage cannot run over a few thousand dollars, and while such a loss may be inconvenient or embarrassing it cannot destroy a business. Dangers of this class include "sprinkler leakage" (damage from breaking of pipes or valves in an automatic sprinkler system), and those which are covered by so-called "water damage" insurance (due to defective plumbing, roofs, down spouts and open or broken windows). These small risks are the only hazards of water which can be eliminated by careful supervision.

The clouds provide an obvious case of a water risk which is beyond human control. Rain of itself may not annihilate a sand or gravel plant, but if a contractor has an emergency outdoor job to complete, rain might so seriously embarrass him that the risk would be worth insuring. And finally when rain becomes hail, it becomes a part of the windstorm risk that manufacturers generally insure against.

The most striking and direct chance of water damage comes under "marine insurance;" that is tugs, dredges, barges—anything that floats on river or lake. Marine insurance dates back to the time when ship owners met at Lloyd's coffee shop in London to pool the risks of their cargoes of bullion and spices on the Spanish Main. Coming down through centuries of study it has become an exact science. Rating schedules have become very accurate; they can be depended on to be a fair estimate of whatever hazard is involved. The result is that now almost everything afloat is well insured.

The buyer of marine insurance should remember that modern policy forms are flexible—that he can get any kind of policy he wants. In considering insurance the business man should start not with rate or premium but with the question, "What risks is my property subject to?" The loss of a dredge, which may be the biggest asset of a corporation, might be vitally serious, but that fact will not necessarily lead to buying every available kind of insurance. The

*Engineer—Moore, Case, Lyman & Hubbard.

buyer will first find out what types of accident can befall a given vessel. Marine insurance includes four risks. Everything afloat is subject to one of these, but the others apply only to certain classes of boats.

The universal risk is fire. Most things afloat contain enough wood to feed a large blaze. Some steel ships can be destroyed by a fire in the electrical machinery or coal bunkers, while even an all steel barge can be damaged by flying brands or falling timbers in a fire on a tug or dock or warehouse near it. Marine fire insurance is therefore necessary because the risk is universal, and no corporation would gamble so big an asset as a dredge or tug against the saving of a small premuim.

The other marine risks are sinking, stranding and collision. They depend not so much on the nature of the vessel as on the place where it is operated. A dredge cannot have a collision if it is the only thing afloat in the neighborbhood, and a scow cannot incur a heavy loss from sinking or stranding in water that is uniformly not much deeper than its draught. Where these risks are not important they should either be excluded from the policy or a material reduction in rate should be demanded from the insurance company.

Rates for marine insurance are made on a scientific analysis of each problem. The rater must consider in detail the construction of each dredge or boat, the use to which it is put, the body of water where it operates, and the risks (fire, sinking, stranding and collision), to which it is especially subject. Full insurance against all risks generally costs somewhere from five to seven per cent, annually for our Middle Western rivers, but both higher and lower rates are possible due to local conditions.

By an odd coincidence it is the newest form of insurance against water damage that most generally and vitally affects the sand and gravel industries. This is indemnity for flood damage.

Although floods have been happening in all except desert countries ever since Noah, and men have been developing scientific consideration of flood control, somehow flood disasters have continued to happen with considerable frequency and even the most complete and well-executed engineering projects have failed to give absolute protection for lives and property. Galveston's sea-wall, built after the great tidal wave of 1900, did not save a $5,000,000 loss in 1915. Dams have been bursting since Johnstown was wiped out. Ice gorges, snow and rain have been combining to make trouble since the inundation of Kansas City, and tremendous downpours have occurred many times and in many places since the great Dayton and Zanesville floods. On the basis of property damaged and destroyed, floods compare with conflagrations. Certainly they are more numerous. And yet the possibility of insuring against the flood hazard is unknown to most property owners.

For three decades or more the United States Weather Bureau has made a study of floods. It maintains a chain or river gauge stations, not only to collect data for safety engineering, but also to broadcast warnings when river conditions are dangerous.

Strangely opposite to this constructive work of the Weather Bureau is the indifferent attitude of many sand and gravel producers and dredgers, the very people who ought to be most cautious. How common it is for a new company to take a gambler's chance on building a plant in a river bottom that "hasn't had a flood for ten years," when a search farther back in the records would show that on an average the same stream is due to overflow its banks one year in every four. And how short-sighted is the firm which erects flimsy wooden tanks and buildings or hugs the river's edge, when concrete construction or a higher location would be certain to save a big loss in the future.

Since 1918 a few of our largest insurance companies have been studying floods and have developed a fair method of distributing flood losses through insurance. The present-day flood policy does not overlap any of the other kinds of water damage. Specifically excluding all these, and also seepage or seep water, it indemnifies a property owner for "direct loss or damage caused by the accidental influx of water." The chief causes of such loss are swollen rivers (from melting snow, breaking of dams or reservoirs, heavy rains), tidal waves, backing up of sewers, and bursting of city water mains. This means that the water must come in from outside the insured premises and enter where it was not intended to enter and thus be out of control.

Only buildings and machinery on land are covered, because dredges and boats are protected by marine insurance.

The underwriting principles of flood insurance are exact. Government statistics furnish an adequate record of most of our lakes and rivers for the past thirty years. It is of course not practical to write covering property on land that is flooded every year or on merchandise in basements that have sewer trouble after every heavy rain. The insurers try to establish a proper rate in every case, and then offer insurance to anyone, no matter how bad the risk may be. But in practice it is found that most flood insurance is sold where the risk is not excessive and the rate is somewhere between one and four per cent. If a property owner seeks flood insurance and finds he can only get it at a rate of fifteen or twenty per cent, he should take this as a serious warning to change the location or construction of his plant before flood wipes it out.

In many cases the direct destruction of property is not the only heavy toll. The sand and gravel business, for instance, is seasonal, operations being limited to about two-thirds of the calendar year. Most floods come in the spring, just when work is starting. If flood washes away a building or wrecks a vital machine and four months are needed for replacement, serious losses follow; salaries of officers and superintendents, and royalties, rents or taxes must all be paid; profits have gone; customers may be lost to a competitor. A year's work is lost. These very real, though intangible losses are covered by flood "use and occupancy" insurance. When a corporation studies its problem of the dangers of unfriendly waters, it should consider not only what physical property might be damaged but also what would be the losses due to the interruption of business.

There is a general principle that should govern the buying of all insurance. There are two classes or degrees of loss. One class includes the minor, or "nuisance," losses. The damage from leaky plumbing or automatic sprinklers, for example, will hardly send a firm into bankruptcy, but it may cripple operations or inconvenience the employer temporarily. Such losses are proper subjects of insurance, but only if the rate offered looks favorable enough to make the policy "a good buy."

The second class is the major losses, such as flood or fire. These calamities can completely wipe out a going business. If one's property is subject to any loss of this class, insurance must be carried just as long as the premium charged is reasonable. Otherwise the property owner is merely gambling with fate. And gambling violates not only the law of insuring, but also sound business principles and the safety of invested capital.

Crushing Plant Destroyed, Struck by Lightning

THE main crushing plant of The General Crushed Stone Company at Akron, New York, was struck by lightning on June 21st at 1:30 A. M. Akron is about 22 miles east of Buffalo on the West Shore Railroad.

This disaster occurred during one of the worst storms ever experienced in that section of the country. Telephone wires were put out of commission at the same time so that it was impossible for the watchman to call for assistance in putting out the fire which followed the stroke of lightning.

The main crusher building was totally destroyed, the frame and wood construction burning rapidly. The Amiesite plant, the machine shops, and a large steel building housing the Edison rolls were unharmed. The crushers were all Allis-Chalmers and the two number tens, the number eight and the one number six remained on their concrete foundations. The foundations of two number sixes collapsed causing them to overturn. The crushers seem to be only slightly damaged, and a considerable amount of salvage can be obtained from the bucket elevators and screens.

The Ruins

Excavating In Sand Pits

By DANIEL J. HAUER

A NUMBER of operators of sand pits have asked the writer to say something regarding the types of machines that are adapted to the excavation of sand.

There are on the market today a number of devices for this class of excavation. It is not possible to tell in a general way the type of machine best suited to a particular operation, but it is feasible to give such general information on the various types of machine that anyone can make the decision for themselves as to what machine to use. The main distinction that the writer would like to make is not based upon the types of machine but rather on the extent of the operation and whether the excavation is to be made over a large area or against a breast.

For a small or temporary pits of either sand or gravel,—and in most cases gravel can be excavated in the same manner and by the same machine that can be used for sand, and the two materials are frequently excavated together and then screened,—there are a number of devices that will do efficient and cheap work. Scrapers of several kinds, such as drag, Fresno, Maney, and other patented scrapers can be used, not only for the stripping but also for the excavation of the materials.

These scrapers will excavate and carry the materials to a pit or trap and from there the material can be elevated to screens. This makes a very inexpensive plant but due to the teams that must be used, the cost of operation runs a little high. With some types of scrapers this cost can be reduced by using small tractors which can pull more than one scraper.

There is also on the market an entire excavating, crushing and screening machine for sand and gravel contained in one unit and mounted upon wheels. Such a machine is useful not only in small pits but in temporary ones for after working at one place it is readily moved to another. The entire construction of this machine is of steel.

In small pits or banks where the material is worked against the breast, excavation especially in sand can be made by the various types of wagon loaders and conveyers. These wagon loaders are now built to do excavation as well as to elevate the material, and such a machine with one or two men to operate it, can handle a fairly large volume of material in a day at a low cost.

A slack line cableway can also be used in a small operation. The fact is this type of excavating machine, both for large and small operation, possesses many advantages. It is easily set up and moved and can excavate over a large area and likewise does stripping as well as excavating of material.

In wet pits, they excavate without the use of pumps as they will dig under water as well as in the dry. Scrapers can be used on these cableways varying in capacity from three-quarters of a cubic yard to five cubic yards.

A drag line excavator with a crane or small derrick car can also be used in small pits. These drag line machines also possess a good many advantages as they work from on top and can excavate under water as the slack line cableway does. The great difference between the two is that there is a limit to the transportation of the excavated material by the crane and drag line, as compared to that of the slack line cableway, the calbleway covering a much longer distance than the former.

These are types of machines that can be recommended for small pits, for large operations some of the same machines can be used and some additional ones. For the large pits one of the most common machines to use is the power shovel. These can be operated by steam, gas or electricity. They are suitable for any bank work where the material is excavated against a breast. So common have steam shovels become that it is not necessary in a short article of this kind to dwell further upon their use.

Cranes can be used in large operations not only equipped with drag-line buckets but also with clam shells and orange peel buckets. The orange peel bucket is not used very much except in wet excavation and where there may be snags or very large gravel as clam shells are preferred over the former and generally have a

(Continued on page 88)

The Ohio River Sand Company Has Modern Plant

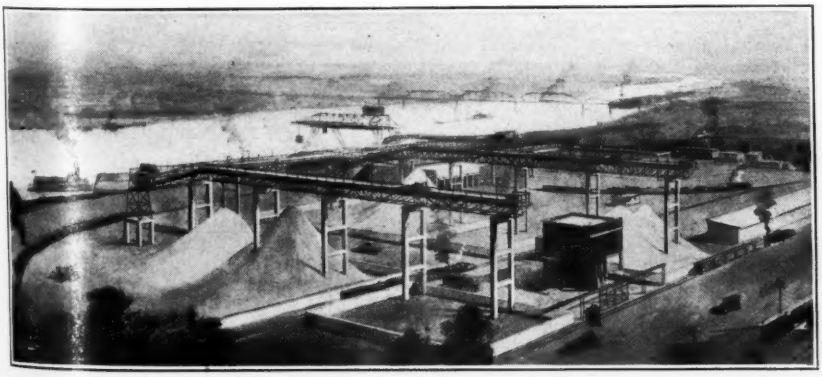
Modern Methods and Machinery Reduce Handling Costs Two Men Distribute Material to Any Point in The Yard

THE Ohio River Sand Company, with office and yard located on the river front at Brook Fulton Street, Louisville, have completed the changes in the old plant and today have a modern economical plant. These improvements costing about $250,000, were designed and installed by the Brown Hoisting Machinery Company of Cleveland, Ohio, and concern the handling of the sand and gravel at the dock. This equipment is all electrically driven.

The present river equipment used in dredging and sucking up sand and gravel from the Ohio River a few miles above Louisville, includes fifteen wooden barges, four all steel barges, one steam towboat, two dredge boats, one unloading digger boat at the receiving plant and one pump boat used to keep the hulls clear of water during the winter period. In late November river operations are usually suspended until spring. The sand and gravel are taken from the river about eight miles above Louisville. The washing and screening plants are located on the digger boat.

The improvements that have effected such economies deal with the handling of the sand and gravel from the time it reaches the dock in barges until it is delivered on the job. The material is taken from the barges by a bridge crane which hoists the material into a receiving hopper. The bottom of this hopper is equipped with a shaker feeder that controls the feeding of the sand and gravel to the conveying system. The conveying system itself consists of two main leads and a series of cross leads and conveyors. The main leads being heavy rubber belts 36 inches wide. One is for direct car loading and the other goes into the yard distributing system. This bridge crane is operated by one man.

The direct carloading as it goes from the hopper on a 36 inch belt up an incline to be spouted into cars on the siding passes over a suspended automatic weighing system made by the Merrick Scale Manufacturing Co. The general superintending engineer in charge says they have had quite an interesting time getting this adjusted for correctness because it only operates within a range of from four to nine pounds per square foot and their load had been rather light to get effective work. That is, the conveying belt has been moving a little too fast for the feeder, and at the time talked to, he was planning to speed up the feeder a little so as to make the load on the belt a little



General View of Ohio River Sand Company

heavier that he might get greater accuracy in weighing. This automatic weighing as sand and gravel goes over the conveyor belt into the cars promises to save much in time as well as furnish a check up on railway weight.

When they are not loading direct into cars the sand and gravel is passed from the main feeding hopper through the conveying system out over whatever branches of the system are necessary to get any one lot of it to a pile or bin where it is wanted. The yard has a storing capacity of 60,000 cubic yards for sand and gravel. Part of this goes into hoppers, and part of it into piling spaces which have been hedged around with concrete retaining walls about 5 feet high.

The old handling equipment, which is still performing some service, was a steam tram hoist with dump cars, the sand being taken out of the barges with steam shovel and loaded into dump cars which are hoisted up an incline to a tower from which a number of divergent tram tracks led to different parts of the yard and to the system of loading hopper bins. There are two large groups of overhead hopper bins for the loading made of concrete to replace the old wooden structures, and the old hoist is still being used some to supply one of these. The other group is being filled by the new electric system. Most of the current business for local delivery is handled from these hopper bins by trucks driven directly under them where they can be loaded in a very few minutes. Then when it is necessary to load for local delivery out of one of the reserve piles in the yard, they have a caterpillar tractor electric elevator for this work, so there is very little call for burdensome hand work anywhere about the yard.

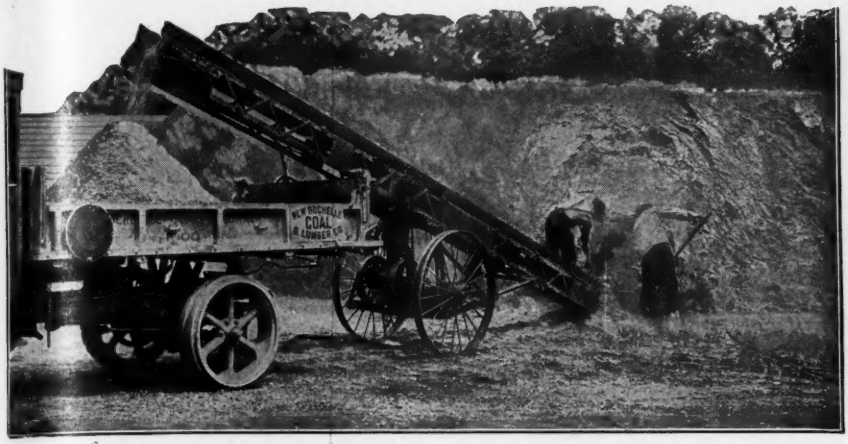
The new equipment, which has a capacity for handling 300 cubic yards an hour, not only makes it easy for them to handle the current needs of their big volume of business, but it enables them to store enough reserve stock in the yard during the summer months to carry them through the hard winter months when it is not practical to carry on big river digging operations. The equipment is all electrically driven from current obtained from the Louisville Gas & Electric Co. The elevated tracks on which the shuttle belt conveyors are operated to different points in the yard have a system of electric lights mounted over them so that they can be operated at night if desired. There are safety cutout buttons at different stations all through the system, and a study of it impresses one that it is just about as thorough and complete, as it is practical to make a conveying and handling equipment for sand and gravel. The officials of the company, when asked about the system and the effected economies in comparison with the old methods of handling, while a little reluctant about going into definite details, said very frankly that they are well pleased with it and that it had cut handling cost as well as increased their handling capacity. In a word, they feel that they have reduced the quantity handling of sand and gravel to almost the ultimate minimum in the matter of cost of yarding and carloading and delivery into trucks for local jobs. And it not only helps a lot in solving the problem of help when labor is scarce but it reduces cost enough to make such an equipment prove a *profitable* investment.

Electrified Cement Mill

Complete electrical equipment of a new cement mill at Coreen, Georgia, is planned by the Clinchfield Portland Cement Corporation of Kingsport, Tennessee. A contract was recently closed by this concern with the General Electric Company for two 1,000 Kilowatt turbine generators, a 16-panel switchboard, over 60 induction motors of various sizes and six super-synchronous motors, four rated 500 horsepower and two 300 horsepower.

In the plant layout, the induction motors specified are of such capacity that they will operate fully loaded and, by including a large amount of synchronous apparatus, it is expected that the entire plant will operate at or very near unity power-factor at all times.

Irving A. Pfeil of the Chicago office of the Blaw-Knox Company has been appointed manager of the company's Detroit branch, succeeding Herbert J. Desson, deceased. Mr. Pfeil has been with the Blaw-Knox Company since 1919.



Straight from the Shoulder

You can now buy a Haiss Portable Belt Conveyor for less than ever before.

1924 is going to be a Haiss Belt Conveyor year. We are building only Haiss quality machines, but on a quantity basis that brings costs way down. And remember first cost isn't the only thing. Haiss Conveyors always did cost least when upkeep charges were added to the cost of low-price machine.

Now you cannot afford a LOW-PRICE machine—a Haiss is so good and costs so little more that there's nothing to it.

Haiss
- Roller Bearing Rollers
- Grease Packed Rollers
- Strong Truss Frame
- 4-ply Rubber Belt
- Adjustable Foot Pulley
- Rigid Head Take-Up
- Patented Side Guards
- Reliable Power
- Reasonable Price

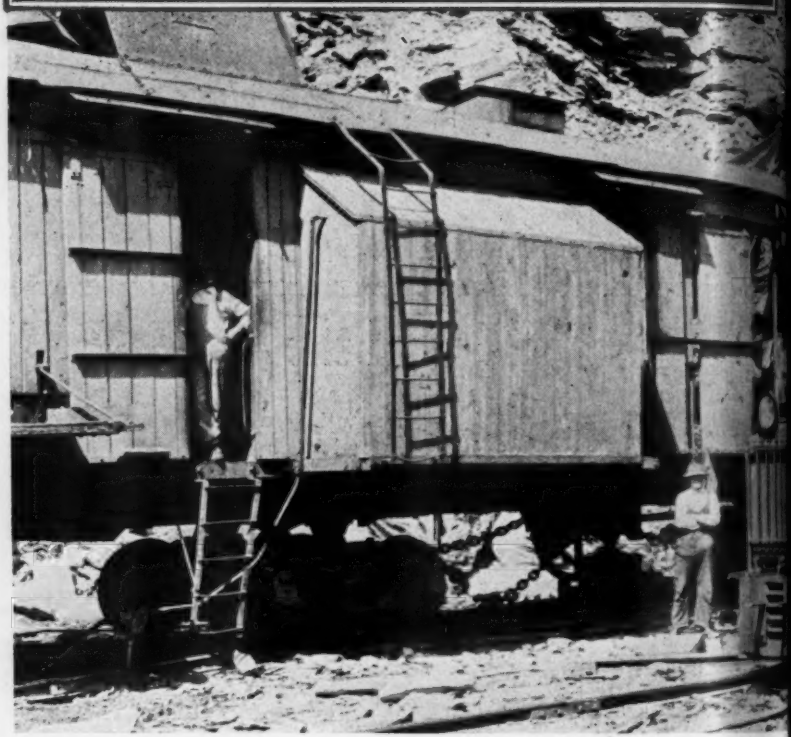
Let us quote you on a 1924 Haiss Portable Belt Conveyor—or ask for Bulletin 1022.

The George Haiss Manufacturing Company, Inc.

142nd St. and Rider Ave.. New York City.

HAISS
MATERIAL HANDLING EQUIPMENT
CLAM SHELL BUCKETS

PLYMOUTH
Gasoline Locomotives



Lawrence Portland Cem Co

The Lawrence Portland Cement Co. of Siegfried, Pa., man well known "Dragon" brand of Portland Cement.

In 1921, they bought a Plymouth Gasoline Locomotive. It well that repeat orders followed until now FOUR Plymouths take ca ul- age.

Please read the letter in adjoining panel—it is both short an

The Plymouth is the most persistent "repeater" of any on the market. It pays to build merit into your product. Ask fo

THE FATE-ROOT-HEATH CO., Plymouth

See P K Page

Co. Endorse Plymouths

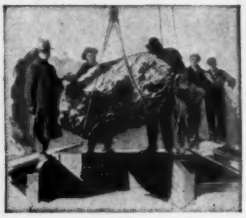
LAWRENCE PORTLAND CEMENT CO.
302 Broadway, New York

The Fate-Root-Heath Co.,
Plymouth, Ohio.

Gentlemen: We purchased three 7-ton Plymouth Locomotives for our cement rock quarry at Siegfried, Pa., as the result of our satisfactory experience with one of your 6-ton Locomotives in our limestone quarry at Annville, Pa.

These three locomotives are also working very satisfactorily.

Very truly yours,
(Signed) Jas. S. Van Middlesworth, Sec'y



How the "Mammoth" Crushes 48" Limestone to ¾"

In even less time than it takes to tell (40 seconds to be exact) 48" cubes of limestone are reduced to ¾" in one operation. Every quarry operator will immediately recognize the economy of this method compared with that employing a primary and two or three secondary crushers with their accompanying elevators, conveyors, drives and buildings. In fact wherever the "MAMMOTH" has been seriously investigated, sales by the Williams Company have resulted. John Herzog & Son's installation crushing 36" stone is a typical example of the saving possible. He saved $20,000.00 in first cost, $4,200.00 annually and cut crushing costs 53%.

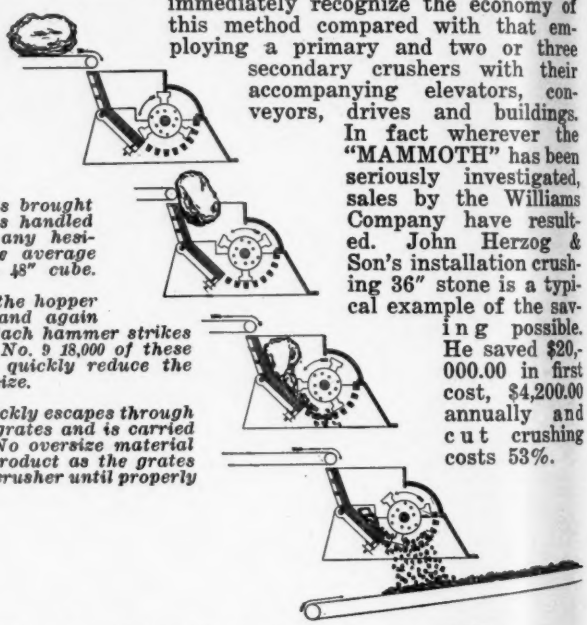
Before

1. *Quarry run rock as large as 48" cubes, anything the shovel can pick up, can be loaded on the feeder and carried to the crusher in a steady uniform flow.*

2. *As fast as the rock is brought up by the feeder it is handled by the crusher without any hesitancy. 40 seconds is the average time required to crush a 48" cube.*

3. *As the stone enters the hopper it is struck again and again by the heavy hammers. Each hammer strikes a 33-ton blow and in the No. 9 18,000 of these 33-ton blows per minute quickly reduce the material to the desired size.*

4. *Crushed material quickly escapes through the openings in the grates and is carried away by the conveyor. No oversize material is found in the finished product as the grates hold the rock within the crusher until properly sized.*



Recent Orders

Columbia Pt. Cement Co., Portland, Ore.

John Herzog & Son, Forest, Ohio.

Trinity Pt. Cement Co., Dallas, Texas.

San Antonio Pt. Cement Co., San Antonio, Texas.

Monolith Pt. Cement Co., Monolith, Calif.

Krippendorf-Tuttle White Cliffs Products Co., White Cliffs, Ark.

Also endorsed by Hunt Engineering Co., who have purchased a "Mammoth" for the new Yosemite Portland Cement Co. plant, Merced, Calif.

After

Williams Patent Crusher & Pulverizer Co.
802 St. Louis Ave., St. Louis, Mo.

CHICAGO
37 W. Van Buren St.

NEW YORK
15 Park Row

SAN FRANCISCO
415 5th Street

Williams

PATENT CRUSHERS GRINDERS·SHREDDERS

Prime Movers for Hydraulicking and Dredging Operations

By GEORGE B. MASSEY.

IN ORDER to make a study of the various prime movers for hydraulicking and dredging operations, it is necessary to study the characteristics of the centrifugal pump, which do not vary greatly with different dredge pumps. Motors and engines will be treated in the second article.

The efficiency of a good water centrifugal pump will run from 75 per cent up to 85 per cent, but the efficiency of a dredge pump cannot safely be taken at over 50 per cent. This is the overall mechanical and hydraulic efficiency and is the relation between the water horse power actually exerted by the pump and the brake horse power of the driving mechanism if direct connected to the pump.

The efficiency starts at zero with the discharge pipe closed and no water being pumped and comes back to zero again with the maximum amount of water being pumped against no head. Between these two points, the curve rises to a maximum and drops back.

The maximum efficiency of any pump at a certain speed will be found to exist when pumping less water against a lower head than is the case with a higher speed. In other words, there is a certain speed for any condition of head and volume of water which will give a higher efficiency than any other speed, either greater or less.

As a dredge pump ordinarily operates against quite different heads, on account of varying lengths of discharge line, it follows that the method of driving the pump should make it possible to change the speed through a considerable range to meet the different conditions.

When a pump is discharging against a long line or a high head, it will discharge less water and requires less horse power than when running at the same speed with a lower head when it will discharge a much larger volume of water. Thus, when the speed is constant and the pipe line breaks, the pump immediately and automatically begins pumping more water and will use a much greater horsepower if it is available.

There are three conditions under which a centrifugal pump may be started—with no water in the shell—with water in the shell and the discharge line open for receiving the water—with water in the shell and the discharge line closed off from the pump by a valve near the pump.

When the pump is started with no water in the shell, the horsepower required is that to overcome the friction or inertia of the shaft, runner glands, etc. That is, of course, a very small percentage of that required when pumping water, probably not over ten per cent at the very outside. In this case the pump is started before priming.

When the pump is started with water in the shell and the pipe line open to the pump, the pump will immediately start pumping large volumes of water and therefore will require a very large amount of power as soon as it gets up to speed, the power decreasing again as the pipe line fills up the head increases. This is the case when the discharge line rises above the top of the pump in a short distance or is closed by a weighted flap valve, and the suction pipe is closed by a foot or flap valve so that the pump is primed by pumping water into it from some outside source.

When the pump is started with water in the pump and discharge line closed off, the power required will be fixed for any given speed and, for that speed, cannot be exceeded while the valve in the discharge pipe remains closed. In this case, the pump is primed by exhausting, from the shell, the air which is replaced by water through the open suction pipe.

When a pump is discharging against a considerable length of pipe line elevated above the pump and with a grade toward the pump and the power suddenly fails, the water in the discharge pipe will run back through the pump revolving the runner backward, and if there is a hump in the

discharge line so that the line will tend to free itself in both directions, the pipe is in serious danger of collapsing unless provided with a valve which will automatically admit air at the hump in the line.

A centrifugal pump does work by lifting the water from one level to a higher level. This difference in level is known as the static head and is expressed in feet.

It also sucks the water into the suction mouth, thereby rapidly increasing the velocity of the water and doing work. This work is represented also by feet of head and is known as the suction head. It is increased when the suction mouth is lowered into the material being excavated as the opening is more restricted and the velocity of the water is increased.

The suction head is observed by reading a vacuum gauge attached to the suction pipe at the pump and reducing the inches of vacuum to feet of head by dividing by 30 and multiplying by 34.

The velocity head is usually so small that it can be disregarded in arriving at the total horsepower required. It is the square of the velocity in feet per second divided by 64.4.

The friction head is only considered for the discharge line as the vacuum gauge on the suction pipe shows the suction head and also the static head to the center of the pump and the velocity head in the suction pipe. The suction and discharge pipes are usually of the same diameter.

The friction head for clear water may be found by the use of Cox's formula:

$$H_f = \frac{\text{Pipe lgth in ft.}}{\text{Diam. in inches}} \times \text{a factor}$$

This factor has the following values:

When v. is	the factor is
10 ft. per sec.	.37
12 ft. per sec.	.53
14 ft. per sec.	.71

For example, if the discharge line is 2,000 feet long and 20 inches in diameter, with a velocity of 12 feet per second, the head due to friction would be:

$$H_f = \frac{2000}{20} \times 53.$$

$$= 53 \text{ ft.}$$

This is the friction head for clear water.

It is obvious that when pumping a mixture of solids and water, the friction would be increased. This is due to the material moving more slowly than the water and so reducing the area for the flow of water. The suction head is also increased.

Except for unusually unfavorable circumstances, it is safe to increase the friction head twenty-five per cent for pumping a mixture of solids and water.

The total head on the discharge side of the pump, including the static head and friction head may be ascertained by connecting a pressure gauge, reading in feet of head of water, with the discharge pipe where it leaves the pump and with the center of the gauge at the elevation of the center of the pump.

If the pipe is running full, the elevation of the discharge end of the pipe must be considered in arriving at the static head, but if only partly full, the highest point in the discharge line must be considered.

The velocity of flow for easy material is 10 feet per second, for average material, 12 feet per second and for harder materials, 14 feet or even 16 feet per second. The latter figure is unusual.

The diameter of the runner is important as it fixes the maximum head (H) against which a pump can discharge at any fixed speed.

The peripheral speed (v) of the runner is found in feet per second.

$$H = \frac{v^2}{2g} = \frac{v^2}{64.4}$$

The water horsepower of a dredging pump is found as follows:

$$\text{W. H. P.} = \frac{AxBxCxDx60}{33000}$$

Where A = area of pipe in square feet
B = velocity of flow in ft. per sec.
C = weight of one cu. ft. of the mixture of water and solids.
D = total head against pump.

As the efficiency of a dredging pump is only 50 per cent, it will be necessary to double the water horsepower to find the brake horsepower or shaft horsepower to drive it.

The weight of a cubic foot of fresh water is 62.5 pounds per cubic foot and the weight of a cubic foot of

sand or gravel is 100 to 110 pounds per cubic foot. The weight of any percentage of solids may be figured per cubic foot.

The percentage of solids varies with the material being pumped, but for most work can be taken at about 10 per cent, with 5 per cent for long pipe lines and hard pumping material.

With the exception of some of the self-propelling river dredges of the Mississippi River type pumping through short pipe lines, all of the pumps used for dredging are of the single suction type. The shell is circular rather than volute and there is no throat on the discharge side. A cross section at the periphery would approximate a semi-circle on most pumps, although some large ones have been built with a rectangular cross section to facilitate fitting liners. Pumps with liners find favor abroad but very little in this country, as they are apt to be the cause of delays during working hours.

The suction throat is kept open so as to pass stones and other material of considerable size. The runner or impeller usually is provided with four blades, but for roots and such trash, three blades or even two can be used, or two full blades and two partial ones.

All dredge pump runners are double shrouded and on some, the blades are equipped with tips which can be renewed. The wear is very excessive on the runner.

On all single suction pumps, the runner is pulled toward the suction opening and this pull is counteracted by thrust bearings on the shaft. The thrust bearing may be of the horseshoe type, ball bearings or a Kingsbury or other special bearing. Whatever bearing is used, it should be ample to take care of the maximum end thrust which will act upon it.

Single suction pumps have two bearings with the runner overhung. As it is necessary to provide a gland and stuffing box for the water service, it follows that the bearing next the pump has to be located a considerable distance from the runner and therefore carries a very large part of the weight of shaft and runner. The size of this bearing is most important. Where pumps are direct-connected to motors or engines, this is the only pump bearing, but when belted, another bearing is added beyond the pulley. This bearing may be of small diameter and short journal.

In order to keep the gritty water out of the stuffing box, a supply of clear water under some pressure is introduced between the runner and the packing material.

There are in general, two classes of dredge pumps, namely: the commrcial size of pump which is adapted to direct drive by electric motor or belt drive by engine, and the special large diameter pumps which are usually built especially for direct connecting to some type of engine.

The materials used in pumps offered as dredge pumps are chilled cast iron, cast iron, semi-steel, cast steel, manganese steel and nickel steel.

Chilled cast iron shells have been found to resist abrasion very successfully, but they are not commercially available.

Plain cast iron shells are all right for earth, peat, muck and other non-abrasive substances, but will wear out very rapidly in sand and gravel. Semi-steel is slightly better.

For a number of years, cast steel shells were used very largely and still are for the large diameter special pumps.

Manganese steel and nickel steel are the best for resisting abrasion and are the cheapest in the long run. Manganese steel shells are available in the smaller pump sizes, and nickel steel in the larger sizes.

It is difficult to state a duty for each class of material, as the abrasive quality of the material being pumped is never twice alike.

For dredging sand and gravel, the most expensive dredge pump is the cheapest in the long run.

New Lime Bulletin

Bulletin No. 311, "Hydrated Lime Makes Concrete More Workable," has just been issued by the National Lime Association.

This bulletin is based upon work done at the U. S. Bureau of Standards and presents in simple style the results there secured. A satisfactory test for checking the result so readily seen in the field has long been sought. Such a test has been found and the results given in this bulletin show conclusively that hydrated lime materially improves the workability of concrete without deleterious effect upon its compressive strength. The curves given on page 8 present graphically the effect of varying amounts of hydrated lime upon both the workability and strength of the concrete mixes most frequently used.

Copies of this bulletin will be sent free upon request. They may be secured from any member of the National Lime Association or from the Association offices at Washington, D. C.

(Continued from page 78)

larger carrying capacity. The clam shell crane or derrick excavates from on top and can be used to great advantage in developing a sand or gravel pit. It has a decided advantage in testing out new pits and developing them for larger operations.

They can also be used under water. The drag line excavator can also be used with the crane and within recent years have shown a greater adaptability for heavy excavation in sand or gravel either in the dry or under water. This same machine is also valuable for stripping the over-burden. Thus it becomes possible with the same crane to use a clam shell or drag line bucket according to which is best suited to do the work. Some steam shovels can be equipped with a different boom and thus be fitted to use a clam shell bucket. Such a shovel could also use a dragline.

Consequently a steam shovel of this type with two booms can use a variety of buckets. The slack line cableway is just as valuable an excavating machine in a large pit as in a small pit, if not more so, for in a large pit the installation is made more substantial and the larger size of the scrapers are used. There is quite a variety of designs of buckets for these cableways. Each is meant to dig under different conditions and these machines, as already explained, not only excavate but transport for the distance covered by the length of the cable. Many different layouts can be planned for them and they are operated with a small force.

For a small operation, the economical idea is to select a machine giving the largest range of work and use one machine only, but in a large operation it is possible and may be necessary to use more than one machine. If there are varying conditions in the pit it may be advisable to have two or more different kinds of excavators, but if the pit presents only one problem of excavating it is advisable to use but one type of machine although there may be several units of this type employed to obtain the required production. It is always well to standardize as much as possible on machines. And in selecting machines it is well to keep in mind the stripping of the overburden as well as the excavation of the material.

A. B. Nielsen Loses Life in Effort to Save Another

ARTHUR BERG NIELSEN, General Superintendent of The Great Western Portland Cement Company, laid down his life June 28, 1924, at the age of 32 years, in an heroic attempt to save his assistant from drowning. Nielsen had been superintendent of the Mildred plant for about three years, prior to which he was with F. L. Smidth & Co., Engineers, of New York, in the design and construction of the Mildred plant. Before coming to the Great Western Portland Cement Company Nielsen was in charge of important engineering work for F. L. Smidth on other cement plants throughout the United States. Nielsen was born in Bergen, Norway, and received his degree in Civil and Mechanical Engineering in technical schools of that country. He came to the United States in 1911 and since then devoted his entire time to the cement industry.

Georgia Clays for Rubber Fillers

A study of Georgia white clays with respect to their use as fillers in rubber has been completed by Department of the Interior technologists on the staff of the Bureau of Mines. The purpose of this work, which was performed in co-operation with the Central of Georgia Railway, was to determine which Georgia clays, when properly prepared, are suitable for use in rubber compounding. Samples were collected from various deposits not now used in preparing rubber filler, as well as clay from those mines which are already producing clay for use in fillers. The samples were washed, dried, pulverized and purified in accordance with good commercial practices, and their chemical and physical properties carefully determined. Tests were then made in commercial plants on selected samples. It was found that some of the clays were suitable for use in making high grade rubber. There was, of course, a considerable range in the properties of the different clays tested. It was shown that fineness of grain is one of the most important physical factors in the reinforcing power of the clay. Further work along this line is desirable.

A New Crushed Stone Plant in Virginia

Radford Limestone Corporation Plant Now Operating Hydraulic Stripping Efficiently Removes Overburden

*By F. T. AGTHE

A LARGE quarry has been opened on the New River, near Little River in Pulaski County, Virginia.

The property, which includes a huge bluff of high grade limestone, affording an almost inexhaustible stone supply, was acquired by The Radford Limestone Corporation in the spring of 1923. Development work was started soon after and the crushing plant, which has been completed recently was given its initial run on March 3rd of this year and was placed on a regular producing basis several weeks later.

The Limestone Quarry

The general view of the quarry gives an idea of the quarry development at the time that the plant was put into operation. The large amount of stone which has been shot down and prepared for crushing, brings out clearly the development work accomplished by the company in order to insure a continuous production.

The quarry presents a number of operating difficulties which have been overcome successfully by the management, the most striking of which is the method employed in stripping. It was decided that the demands of the trade are such that a clean, high grade stone is essential and in order to meet these trade requirements the management at Little River made every effort to prepare the stone in the quarry so that the products of this plant will be uniform and of the highest quality. The absence of mud seams made this possible, although it has been found necessary to strip the stone thoroughly. This stripping is carried on by hydraulicking.

The water for the stripping is pumped from the New River through a six inch pipe line to a Monitor,

*Engineer—Worthington Pump and Machinery Corporation.

Crushing Plant Showing Bins

equipped with a 1″ nozzle. A pressure of 200 pounds is maintained at the nozzle which insures efficient removal of the overburden. In the cleanup before well drilling is begun, the final stripping is carried on by using in place of the Monitor, a fire hose, which permits a jet of water to be directed into the small irregularities of the rock surface. In this way the rock is made thoroughly clean before it is prepared for the steam shovel.

The pumping station is located near the river and consists of two duplex pumps, one unit pumping the water from a river to a large tank, the other pump, which is a high pressure unit, pumps the water from the tank to the nozzle.

A Model 61 Marion steam shovel is used for loading the material in the quarry. The machine is equipped with a 2½ yard dipper of the Mesaba type and loads the rock into a four yard Kilbourne & Jacobs side dump car 36″ gauge in which it is hauled to the primary crusher by 9″x14″ twelve ton Porter saddle tank locomotives. The gauge of the quarry tracks throughout is 36 inches.

Crushing Plant

During the last decade, many factors have been at work in the development of the stone industry. The general use of concrete for building and general construction work; the development of the automobile with the attendant development of permanent highways; the increasing use of pulverized limestone as a fertilizer; and the wider use of rock ballast for the maintenance of the railroads have all developed the stone business to astonishing proportions when viewing the situation under conditions that existed a few years ago.

These developments have made the stone industry one of national importance and with the growth of this business the necessity to reduce the operating costs has been felt keenly as in all other enterprises. The general use of the steam shovel has resulted in the development of large shovel units, so that the modern quarry operator now reduces his operating costs by using large shovels equipped with large dippers; blasting down large quantities of stone in a single blast and by arranging his crushing plant so that a minimum of labor for handling and for secondary blasting is required.

The officials of the Radford Limestone Corporation gave these facts careful consideration in the design of the crushing plant and it was finally decided to install a primary crusher of sufficient size to handle the stone from the quarry so that a minimum

Drill Crew at Quarry

of secondary blasting would be required.

In the crushing plant, stone is fed to a 42″ Worthington Superior McCully Gyratory Crusher which is a short shaft crusher of great strength and ruggedness. This machine is the primary breaker and reduces stone small enough to be fed to the secondary crushers without further crushing. The primary crusher will take all of the stone that can be loaded with the Model 61 Marion steam shovel equipped with 2½ yard dipper and requires very little attention at the hopper.

The crushed material from this machine is conveyed to a 60″ diameter Worthington McCully all roller type scalping screen by means of a belt conveyor built on an angle of 18 degrees. This conveyor is equipped with five unit ball bearing carriers, the belt of which is an eight ply rubber conveyor belt with $\frac{3}{16}$″ rubber covering.

The oversize, or rejections, from the scalping screen is fed to the two reduction or secondary crushers by gravity, the stream to these crushers being so divided that each reduction crusher gets the proper proportion of material. The smaller of the two machines is a 10″ Worthington Superior McCully Fine Reduction Crusher having a capacity of approximately 110 tons per hour. The larger machine is an 8K Allis-Chalmers Gates type gyratory crusher which has been equipped with a reduced throw eccentric and adapted to secondary crushing. The undersize, or screenings, from the scalping screen is fed to a 30″ belt conveyor which conveys this material to the finishing screen. The product of the two reduction crushers is returned to the scalping screen by a 30″ return belt conveyor connecting with the large 36″ belt conveyor from the primary crusher, so that the scalping screen oversize, after having passed through the reduction crushers, is again returned to the screen.

This arrangement insures a sized product for the finishing screen which makes it possible to handle a large tonnage in the screen, which is equipped with a 10′ dust jacket. The products made in this plant are especially well sized, showing that the screening arrangements have been worked out correctly.

Monitor for Hydraulicking

There are no elevators used in the plant and a system of signals and the remote control of the motors has made it possible to operate the plant with the minimum number of employees. The maximum tonnage of the plant is about 1,800 tons in ten hours, although under favorable conditions it is quite possible that this tonnage will be exceeded.

The management has made provisions for the installation of a 6″ Worthington Fine Reduction Crusher which is similar in design to the 10″ crusher described but will have a finer setting so that if desired, a larger percentage of small sized stone can be made. Preparations have also been made to install a Hummer screen for the separation of the fines from the finishing screens so that a ½″ ring size product can be made with the dust taken out. This dust will be further separated into asphalt filler and agricultural limestone. With these arrangements the Radford Limestone Corporation will be in a position to produce all sizes of stone from 5″ ring size down to ½″ ring size.

The motors throughout the plant were furnished by the General Electric Company and each large unit is driven by individual motors, except the two screening units which are driven in connection with the belt conveyors discharging into these screens. The conveying equipment was furnished by the Stevens-Adamson Manufacturing Company of East Aurora, Illinois. The three belt conveyors, which are used, are equipped with ball bearing unit carriers and with extra heavy rubber belt. All of the crushing machinery, except the 8K Crusher, was furnished by the Worthington Pump and Machinery Corporation, 115 Broadway, New York, and the construction work was carried on under the direction of the Radford Limestone Corporation.

The plant was designed by the Engineering Department of the Power and Mining Machinery Works of the Worthington Pump and Machinery Corporation, Cudahy, Wisconsin, and complete working drawings were furnished for plant construction.

The Radford Limestone Corporation have adopted very thorough methods in the operation of this property and in the use of new and modern equipment throughout the plant, have prepared the way for the production of material on a large scale with a continuity of operation which will enable the plant to fill the market requirements at all times. The general offices of the company are located in the First National Bank Building, Roanoke, Virginia. The officials are: Tayloe Rogers, President and General Manager; L. R. Hammond, Vice-President and Treasurer; W. H. Faulconer, Vice-President; Warren W. Cline, Secretary and Assistant Treasurer; and J. H. Harris, Superintendent.

Drilling Rig.

Talc and Soapstone in 1923

The Department of the Interior reports that the total quantity and value of talc and soapstone produced and sold in 1923, as reported by producers, was 196,692 short tons, valued at $3,012,253, according to information compiled by the Geological Survey in cooperation with the State Surveys of Georgia, Maryland, New Jersey, New York, North Carolina, and Virginia. These figures represent a decrease from 1922 of 1 per cent in quantity and an increase of 5 per cent in value.

The Browning Co., Cleveland, manufacturers of Browning locomotive cranes, announces that J. L. Levy has joined its sales force and will be attached to its Chicago office, 664 Peoples Gas building, Chicago. H. K. Robinson has also joined the Browning organization and will represent it in the St. Louis territory with headquarters at the Browning Co.'s offices, Federal Reserve Bank building, St. Louis.

The Government Derrick Boat "Monallo"

A 50 Ton Derrick—Full Circle Revolving Type Designed for Dredging, Lifting and Pile Driving

THE United States Government is operating a 50 ton derrick boat on the Monongahela and Ohio Rivers in construction work handling heavy steel in connection with locks and dams and also handling a 5 cubic yard bucket dredging and in filling coffer dams. The boat is named "Monallo" representing a curious combination made up of the syllables of the three rivers which meet at Pittsburgh, namely the Monongahela, Allegheny and Ohio.

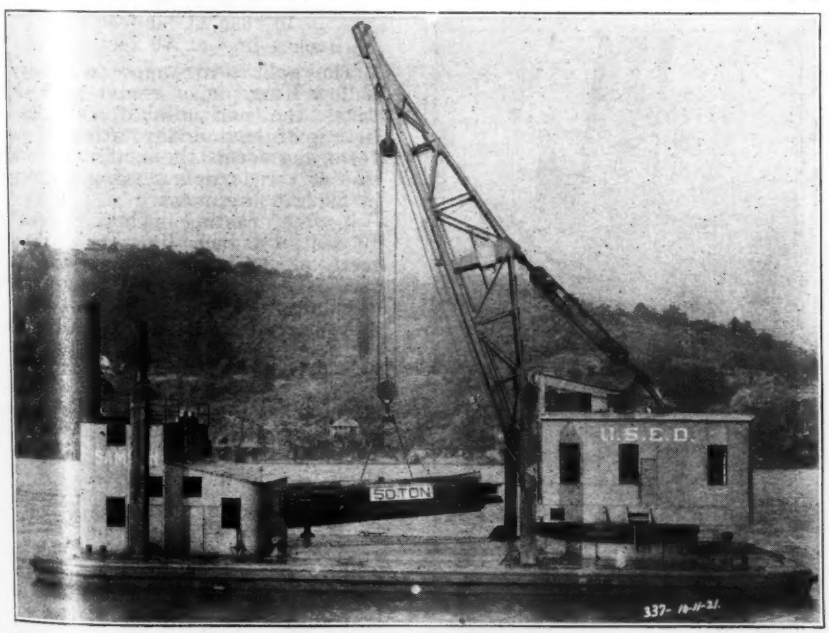
The mechanical equipment consisting of power plant and revolving derrick is placed on an all steel flush deck hull. A two boiler power plant, coal bin and adjoining tool house are located at the stern of the boat. With this arrangement, the derrick can be used to fill the coal bin. The 50 ton derrick is of the full swing circle revolving type and is mounted at the bow of the boat in such a position that the clear reach of the boom over the bow is equal to that over the sides. The large deck space between the power plant and derrick is utilized to carry heavy loads. This boat was designed for heavy lifting work but the engines are very powerful and the rope speeds developed sufficiently high that it has been used for general all around derrick work such as dredging with an orange peel bucket.

The Hull, Capstans and Spuds

The general dimensions of the hull are:

Length	110	feet
Width	45	feet
Depth at center	8	feet
Depth at sides	7½	feet

A white oak fender 8 inches thick and 12 inches high extends entirely



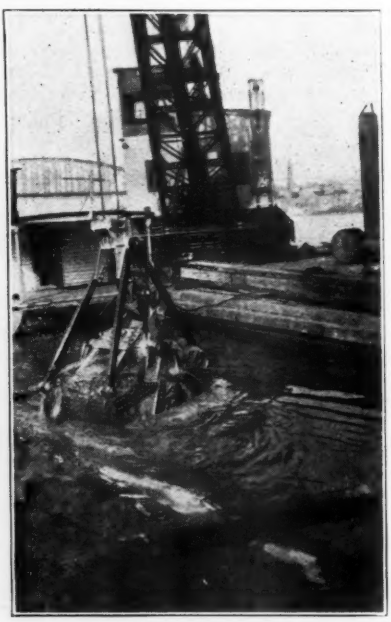
The Government Boat Monallo"

around the hull. The hull is subdivided into eleven water tight compartments. Each compartment is provided with an 18 inch cast steel frame deck scuttle. For placing the spud and capstan machinery in the hull, additional plate steel batchers are provided. There are three 12½ inch single barrel capstans driven by 7x8 cylinder Osgood piston valve reversing engines. The capstans are arranged for steam or high and low speed hand operation. These capstans can develop an ultimate rope pull of 40,000 lbs. at a speed of 35 feet per minute.

The spuds are made of 24 inch by 24 inch Oregon fir. They are 40 feet long. The spuds are hoisted by 1 1/8 inch line loading to a drum and reduction gearing by means of 7x8 Osgood double cylinder engines.

The Boiler House

The boiler house and tool house are built of plain galvanized iron framing. The roof of the boiler house is made of ¼ inch plate to provide a working deck. The boiler house contains one coal bin to hold 20 tons of coal thus reducing the necessity for frequent holding. The floor of the coal house is covered with concrete 3½ inches thick. The boilers of 62x180 inches are of the vertical flue type. They are provided with scale chamber and ash pan with independent injectors. A feed water heater and a galvanized service tank are located on the gallery in the boiler house. A general service pump, a boiler feed pump and a 5 K.W. turbine generator set with switchboard for electric lighting are located in the tool house. The tool house is provided with a toilet room. An oil storage room is partitioned off from the tool house.



The Bucket in Action

The Revolving Derrick

A revolving derrick is mounted on a circular girder 24 inches in diameter, equipped with 100 lb. rails. On this rail is mounted a roller circle containing thirty-two (32) 18 inch Carnegie double flanged rolled steel wheels. The cage is of 9 inch channels. Rollers have 2 inch pins, hollow bored for lubrication. Revolving portion of this derrick rides on 100 lb. rail circle. The upper circle carries four girders 30 feet deep. The derrick boat is designed to lift the following loads.

50 tons at 45 feet radius
30 tons at 60 feet radius
20 tons at 70 feet radius
15 tons at 80 feet radius
10 tons at 80 feet radius
Bucket line at 80 feet radius

The hull is arranged to receive a hollow King pin or center post which takes the horizontal forces due to listing of boat and rotation of platform and forms the center of revolution of the derrick, serving to keep it in perfect alignment.

A steel casting swinging rack of 19 feet, 1½ inch diameter with cast teeth of 3¼ inch pitch and 9 inch face is securely riveted to an inside circular girder.

A heavy angle iron riveted to this circular girder together with a circular segment in front and rear of rotating platform forms a retaining ring, which takes all the unbalanced vertical forces which would be caused by impact or by overload.

Engines

The swinging engine is a 9½x12 double cylinder reversible Lambert engine with double action brake and with one spur and one bevel gear reduction. The vertical swinging shaft is 7 inches in diameter, forged integral with rack pinion, running in solid bronze bushings mounted in cast

steel dead eye supports or bearings. Swinging speed is one revolution in two minutes at 200 R.P.M. of engine or 1 R.P.M. at 400 R.P.M. of engine.

The main engine has a 12½x16 inch stroke and is a three drum double cylinder Lambert type, fitted with steam thrusts. The boom drum is of the Lambert dead shaft type. All drums are fitted with wrought steel jackets and are 28 inches in diameter and 30 inches between flanges. Brakes are fitted at the opposite ends from the frictions. Ratchets are of cast steel. The engines have two spools on the main drum shafts. All fixtures, fittings and tools are complete. A fair lead is provided for the two main hoist ropes.

These engines are very powerful and the rope speeds developed are sufficiently high to use this equipment for general all around derrick work, such as dredging with an orange peel bucket, pile driving, etc.

All motions are independent of each other and may be performed simultaneously.

The Boom

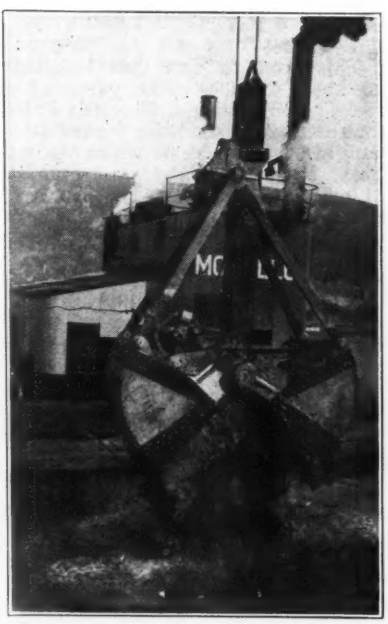
The boom is, 75 feet 0 inches center to center of a variable radius, and carries three sheaves at the outer end; two of these sheaves being for bucket operation, one sheave for heavy lifting. In general, all the sheaves throughout this boat are 33 inches O.D. except the inside sheaves in the boom topping block which are 26 inches O.D. All hoisting ropes are 1-inch Plow steel Roebling quality. Two separate ropes are provided for operating the orange peel bucket and a separate rope for the main lift. These ropes are so arranged that it will not be necessary to dismantle the ropes from the boom. The only change necessary will be to disconnect the one bucket line from the hoisting drum and bending on the main hoist line. The main block and hoisting line can be swung under the main boom. An auxiliary hand operated drum is provided at the lower end for the purpose of reeving the one bucket and the main hoist line out of the road as the operation may call for. One bucket line capable of handling ten tons is always ready for use. The house mounting is of the same construction as the boiler house.

Pipe and Fittings

All live steam piping is covered with 85 per cent magnesia covering and canvas jackets. Each of the eleven compartments of the hull are fitted with a 2 inch syphon piped to discharge above deck of the boat. The valves and throttle levers controlling the syphons and machinery below deck are neatly grouped together in the tool house. A 12 inch extra heavy pipe with steel flanges riveted to the bottom and deck plating and fitted with screens forms of sea well to which are connected the suction lines of the boiler feed injectors, boiler feed and service pumps. The service pump furnishes the water for the feed water heater and service tank. The boiler feed pump delivers the water from the heater to the boiler. Both pumps can be connected into a service line for which a 50 foot fire hose is furnished.

The exhaust from the auxiliaries, such as pumps and steam turbine is piped into the feed water heater. A swivel joint fitted around a brass pipe located at center of revolution delivers the live steam from the stationary to the rotating part of the derrick. The exhaust of the derrick hoist and swinger engine is discharged into the atmosphere.

All live steam fittings are Crane Company's, of extra heavy pattern.



The 5 cu. yd. Dreadnaught

The piping is arranged with a view to facilitate the making of repairs to each unit of the power plant, without interfering with the operation of any other unit.

There are furnished two ashwalls made of 12 inch extra heavy pipe, located near each boiler, for discharging ashes from the ash pan.

Material and Workmanship:

The materials used are the very best for their intended purpose and conform to the specifications and requirements of the American Society for Testing Materials. All steel castings which are subject to severe strain and wear are annealed open hearth steel.

The workmanship is first class in every respect and all parts are designed to give ample reserve strength to make this equipment stand up under the worst of operating conditions.

Weights and Draft

The weight of the boat exclusive of water in boilers, coal and counterweight is 410 tons.

The weight of boat including water in boilers, 20 ton coal and counterweight is 540 tons.

The draft of boat without load is 4 feet 0 inches.

The freeboard of boat without load is 3 feet 6 inches.

The Bucket

This boat to date has handled in all about 200,000 cubic yards of material in dredging. The Blaw Knox Company furnished the 5 yard Dreadnaught type bucket which is used. This bucket weighs approximately 21,000 lbs. empty. The bucket is equipped with an extra submerged sheave in the head so arranged that it can either be used for a two part hold line or for 5 part reeving of the closing line. The lever arm is of structural steel carrying on its outer end a pivoted block in which are placed the two lever arm sheaves. The lever arm sheaves turn in the block on a separate manganese steel pin. This arrangement gives assurance of straight line lead between the lever arm sheave and the head sheave. The sheaves are protected against sand and other materials as the block containing the sheaves has a protective shoe at the bottom. The lever arm sheave is keyed fast to the pin and the pin itself turns in the bearings in the block so that there is no turning of this one sheave on the pin. The other sheave turns on the pin and has an exceptionally long bearing thus increasing the life of the bushings and eliminating the possibility of the sheave getting out of alignment. The lever arm sheaves are equipped with manganese bushings turning on a manganese pin. Corner bar pins are of hardened steel.

The scoops are especially sturdily and substantially constructed equipped with an extra heavy two inch high carbon steel lip and a 1½ inch top band both extending completely around the scoops from hinge to hinge. It is interesting to note that a special packing has been provided between the sheaves and the lever arm to prevent sand or other abrasive material getting in and causing wear.

This bucket has handled 90,000 cu. yds. in 30 days of 16 hours each or an average of 3,000 cu. yds. a day.

This boat was designed by C. M. Wellins, a mechanical engineer. It was built by the Dravo Contracting Company of Pittsburgh. The operations of this boat are under the control of the United States Engineers.

A Visit to Muscle Shoals

A new bulletin which will be of interest to all those who specify and use concrete has been issued by the National Lime Association. This bulletin, No. 310, "A Visit to Muscle Shoals," tells briefly the story of the concrete work at the Wilson Dam. The bulletin is profusely illustrated and a graphic chart shows the tremendous size of the structure as compared with the other large masonry structures of the world. As an example of the mass of concrete, it will be noted that the concrete in the dam would build an 18-foot road, 6 inches thick and 735 miles long.

Construction problems such as the hauling of wet mixed concrete, the placing of this concrete at a dry consistency in involved form work and the vital necessity of smooth surfaces and an absolutely dense and homogeneous concrete made the use of hydrated lime in the concrete essential. The effect of this addition of hydrated lime is clearly shown in the numerous illustrations and in the summary of the test results of cylinders made during construction.

Copies of this bulletin may be secured upon request from any member of the National Lime Association, either the division offices, or from the headquarters office, 918 G Street, N. W., Washington, D. C.

A Modern Sand and Gravel Plant Hydraulically Operated

Kickapoo Sand and Gravel Company Complete Plant, Excavate, Transport and Elevate Material by Pumps.

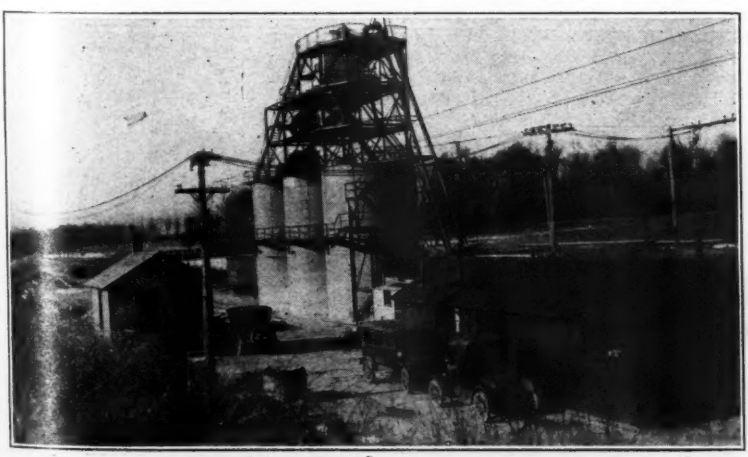
THE Kickapoo Sand and Gravel Company of Peru, Indiana, has completed a new modern fireproof sand and gravel washing and screening plant. It is half mile west of the city limits of Peru on the Chesapeake and Ohio Railway. The plant is within the Peru switching limits, thus permitting shipping over the Nickel Plate and Wabash Railways as well as the Chesapeake and Ohio.

Their dredge boat is all steel construction with a hull 24x70 feet, a cabin 20x60 feet, and a 5-foot overhang deck in the rear. This boat is equipped with a 10-inch Swintek suction screen nozzle 55 feet long, operated by a three-drum Thomas electric hoist. A 10-inch Amsco manganese pump driven by a 200 horsepower motor excavates the gravel and forces it through a 10-inch pipe line supported on steel pontoons to a concrete sump at the screening plant. This pump excavates, transports and elevates the material to a shore sump position.

There are three reinforced concrete cylinders each with a 20-foot inside diameter and 32 feet high. Each cylinder is divided by a partition, thus making six separate bins. An all-steel structure on top of these bins supports the screens and settling tanks.

The pipe line from the boat discharges onto a grizzly which separates the oversize material and discharges it into either one of two number 4 Austin gyratory crushers located between the sump and the first bin. The first set of revolving screens discharges into this first bin and rejects can be fed directly into either crusher. Each of these crushers is driven by a 25 horsepower motor.

All material passing the grizzly along with that from the crushers is rehandled by another 10-inch Amsco dredge pump to the top of the screening plant. The discharge from this pump empties into a large dewatering box which discharges the material to the screens. An overflow pipe in this dewatering box carries away all excess water, fine sands and foreign matter. This pump is driven by a 150 horsepower motor. The screening plant consists of two rows of



Plant—Kickapoo Sand and Gravel Co.

Gilbert type conical screens, three on each side. The lower screen in each row has a double jacket. Power is supplied by a 20 horsepower motor. Three sizes of gravel, 2½, 1½ and ¾-inch and ¼-inch sand are produced.

Clean water for washing the gravel in the screens is provided by a 6-inch centrifugal motor driven pump. All motors are 440 volt and power is supplied by the Peru municipal plant.

Trackage is provided for ground storage and both piling and reclaiming are handled by an Orton Steinbrenner locomotive crane. The bins are equipped for truck loading on one side and for car loading on either side. Empty cars are delivered on a hump track from which they are dropped by gravity to the bins for loading and from there they go to the load storage track.

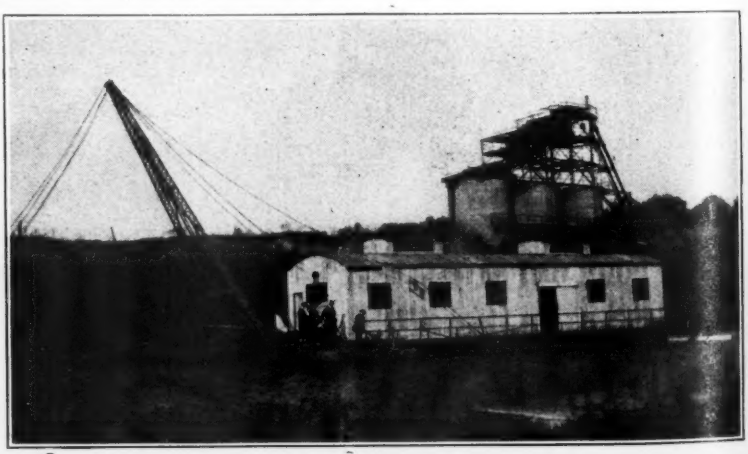
The plant was designed by P. A. Stewart in co-operation with Amsco Pump Department Engineers for a capacity of 180 tons per hour. The workshop is an all steel building 16x40 feet and there is a frame office building adjacent to the plant.

The Kickapoo Sand and Gravel Company classify their product as concrete gravel, roofing gravel, road gravel, torpedo sand, building sand and ballast. The president of the company is P. A. Stewart and G. J. Mattkemper is vice-president.

The unique feature of this plant is that it is hydraulically operated throughout. The plant represents an economical layout. It is interesting to not the power provisions for operation. A 200 h.p. motor drives a 10 inch American Manganese Steel pump that excavates transports and elevates the material to a shore sump position. Evidently there will be little power wasted here. All the motors are 440 volt. Then again pump manufacturers have carefully studied the power requirements of their pumps under any and all conditions and there should be little excuse for much power waste.

The storage bins also represent an economical arrangement. They are concrete cylinders with an all steel structure supporting the screens and settling tank. They are located alongside the Chesapeake and Ohio Railway and still quite close to the river. Thus the material can be handled from the river to storage and from storage distributed with a minimum of expense.

The General Motors Truck Company announces that the executive force of the home office at Pontiac, Mich., has been strengthened by the addition of Otto E. Stoll, one of their vice presidents, and formerly in charge of the New York branch and the eastern territory. Mr. Stoll, who has been with General Motors since the beginning, will relieve W. L. Day, president and general manager, of some of his duties.



Dredge Boat and Bins in Background.

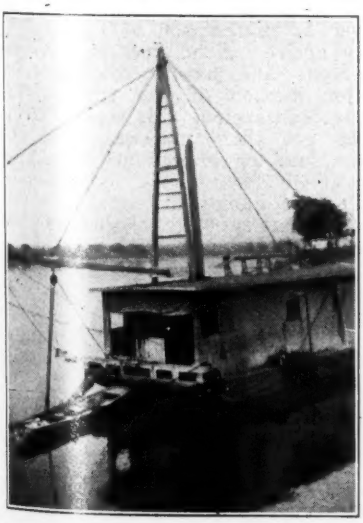
Thoroughly Washed Sand and Gravel Produced at Rock Island Plant

Rock Island Sand & Gravel Company Plant Modern Normal Shipments Average 1000 Cubic Yards Daily.

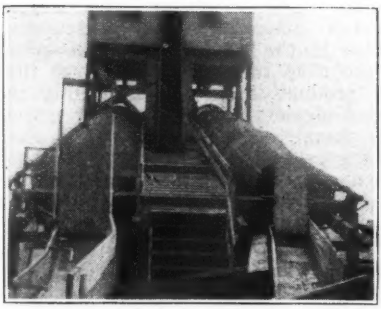
THE plant of the Rock Island Sand and Gravel Company at Rock Island, Illinois, has been in operation about three years. A very satisfactory quality of material is secured under economical conditions. Three grades of gravel and two grades of sand are being produced. The plant has a capacity in excess of 1,000 tons a day.

The plant is located along the Mississippi River in the southwest end of Rock Island. The gravel screening plant is on the north side of the property. This location permits a wide range of territory for distribution. In addition to the river facilities for shipping, the Chicago Rock Island and Peoria, the Chicago Burlington and Quincy, the Chicago Milwaukee and St. Paul, and the Rock Island Southern railroads are available.

In 1920 the company purchased 55 acres of land with an overburden of 5 feet. The plant was built in 1921. This overburden is removed by a 14-B Bucyrus shovel with a ¾ yard bucket, loaded into 7½ yard Western dump cars, drawn over a 24-inch gauge track by a Brookville gasoline locomotive, and deposited in the low places in the property, that are being brought to grade. Stripping has been completed on more than three acres.



Dredge Boat Driven by 200 H.P. Motor.



Dull Conical Screens.

The material is pumped by a 10-inch Amsco pump driven by a 200 h.p. Allis Chalmers motor into a flume that discharges into a concrete sump from which the material is elevated by a Caldwell manganese bucket conveyor to the screens. The material is dumped onto a grizzly from which the oversize material is sent by a chute to a number 3 Austin gyratory crusher and the crushed product is dumped back into the concrete sump for re-elevating and screening.

The screening plant consists of two sets of four Dull conical 96 inch screens with sand launders and discharge chutes.

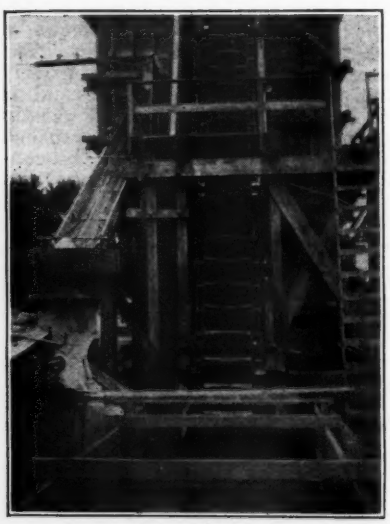
The loading side of the bins are equipped with sand and gravel gates and chutes, two sand separators and water discharge. Each bin has two gates. The switching tracks are on this side of the bins and a 7½ h.p. Mead Morrison car mover is used in setting the cars. On the opposite side of the bin, barges and trucks are loaded. Shipments are made to out of town points by rail while local ship-

ments are distributed by trucks and barges. They have a distributing point in the heart of Rock Island on the Mississippi River. The material is towed to this point from the screening plant by steamboat where it is unloaded into steel hoppers to further facilitate loading for local delivery.

These steel hoppers hold 500 cubic yards. A Brownhoist locomotive crane is used in unloading the barges. This crane has a 1½ yard bucket and in addition to unloading the barges it fills the hoppers and loads cars.

The sand and pebbles receive a final rinsing before loading into cars or trucks thus removing all possible foreign material. The outstanding factor in the operations of this plant is the care that is taken to see that the product is very clean. Only the sound elements of the sand or gravel are permitted to remain. The sand that goes to the stock pile is washed down a pipe line that may be disconnected at any point and the sand stocked at this point.

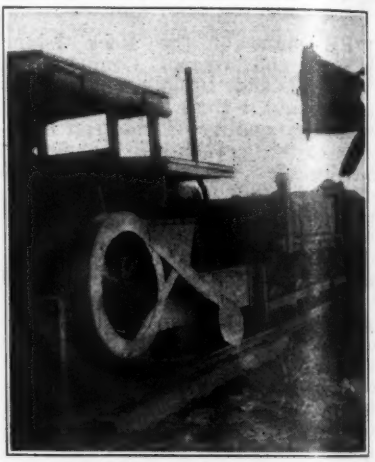
The Rock Island Sand and Gravel Company supplies in addition to the cities of Rock Island, Davenport and Moline a vast extent of territory both inland and along the Mississippi River. The bulk of the requirements are for material from ½ to 1½ inches so all material over 1½ inches is crushed to finer sizes.



End View of Bins.

A Lidgerwood three drum hoist is used to unload barges in case there is an accumulation of stock on the barges at the wharf.

On the sides of the bins used for truck loading, a concrete driveway has been built.



Brookville Locomotive.

Sand is reclaimed from storage and shipped during the winter months when it is not practical to operate either on the river or at the sand plants.

This section of the Mississippi River at this season of the year is very active. Sand suckers, dredges, towboats and barges constitute the major portion of the traffic. The many plants along this section of the river get their material from the river, load on barges and tow to a convenient point for distribution. There are numerous quarries in this section that supply the crushed stone needs.

The present officers of the company are C. J. Larkin, President; G. H. Richmond, Vice-president; W. H. McConochie, Treasurer and H. J. Larkin, Secretary and Manager.

It is announced that Fred J. Mershon, who for years was Export Sales Manager of the Industrial Works at Bay City, Mich., has been placed in entire charge of the Detroit branch office of this concern, located in the Book Building.

The Arkansas River Sand Company Operate Two Plants

Two Plants on Opposite Sides of River Identical Cement Blocks also Manufactured at Katy Plant.

THE Arkansas River Sand Company operate two plants eight miles from Tulsa, Oklahoma at Sand Springs. Between these two plants and Tulsa are twelve sand boats six on each side of the river. One of these plants called the Katy plant is on the M. K. T. Railway and the other indirectly across the river and on the Frisco Railway. Each plant is a duplicate of the other and all parts are interchangeable. This lessens the danger of a shutdown and necessitates keeping only one set of reserve supplies.

Each plant has a boat 18x28 feet equipped with an 8-inch undershot Erie pump with an 8-inch Erie in reserve. One man handles both the boat and the pump. The pumps are driven by 100 horsepower 3 phase 60 cycle General Electric Motors.

The sand is carried by 8-inch American Spiral to a 9x20 foot dewatering hopper. The sand is handled but once. Loading in direct from the dewatering hopper to the cars. One spout of the hopper is placed extra high to insure accomodating any car. One man operates the hopper.

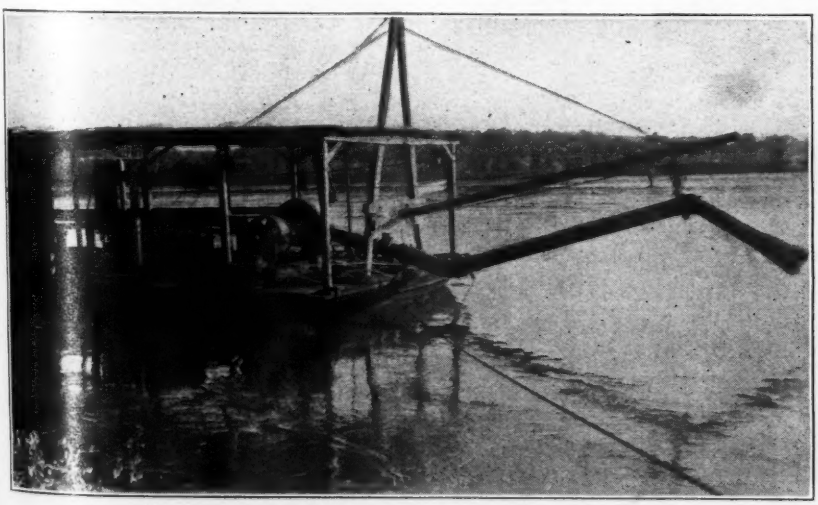
A large reserve supply of sand is maintained. Loading is accomplished during freezing and unfavorable river conditions with a dragline and belt elevator designed and built by the Arkansas River Sand Company patterned after Joplin and Miami chat installations. An American Hoist and Derrick twin engine and double drum hoist is used in the operation of this dragline. Gas is used for fuel.

Cement blocks are manufactured at the Katy Plant. A Kent mixer and two concrete block machines with a capacity of 300 blocks each are used.

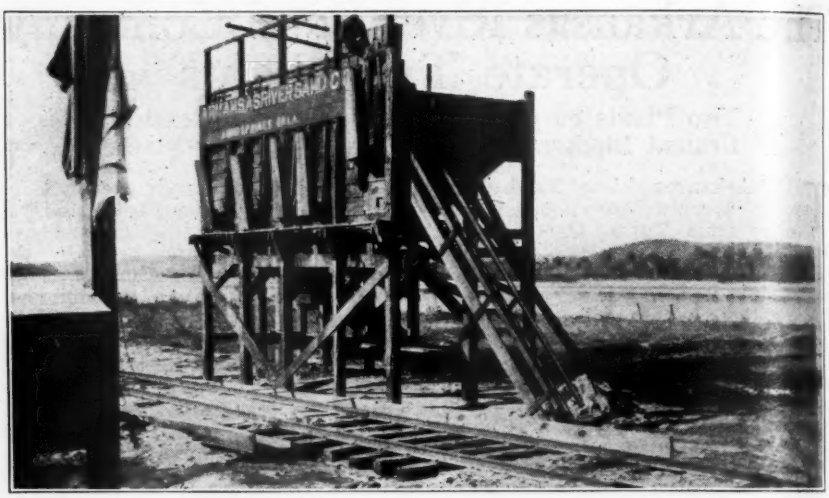
The floods of last year caused considerable damage to the plant. The office, cement house, ties, tracks, foreman's house, lumber, pontoons and half of one hopper were washed away.

Mr. W. E. Rogers, president, states he has run the two plants with three men loading five cars in the morning at the Katy plant and five cars in the afternoon at the Frisco plant. This was done with one man on the boat, one on the dewatering hopper and one to move the cars on a gravity track.

One man has chinked and loaded six cars in a single day single-handed.



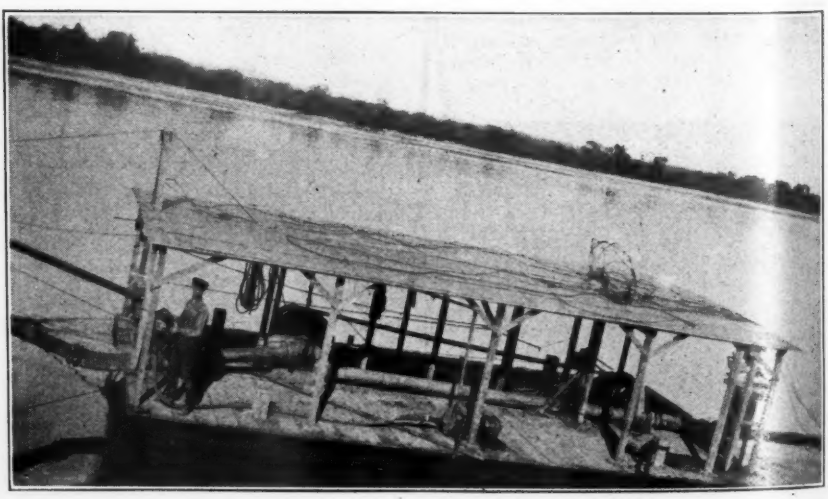
Plant Number One.



Dewatering Hopper.

Mr. Rogers also states that his Erie pump can easily pump a 100,000 pound capacity car in twenty minutes —that once when river conditions were favorable ten cars were loaded during one afternoon. The box opposite the hopper shown in the illustration is used for bills of lading.

The manufacture of cement blocks by this company has proven to be an economical proposition. All surplus material produced can be thus used to good advantage and when conditions are such that river operations are not practical cement blocks can be manufactured. Then again a business depression is not felt so keenly. There is nothing complicated about the manufacture of these blocks. Any ordinary workman can operate and handle the mixer and the block machines. These block machines were manufactured by the Francis Machinery Company of St. Louis, Missouri and the Kent Mixer by the Kent Machine Company of Kent, Ohio.



Plant Number Two.

Pittsburgh Sand and Gravel Conditions Favorable

Bulk of Cement Output Distributed —Market Quotation at Uniform Level

By our Pittsburgh Correspondent

RIVER operations for sand and gravel production are being maintained at a good rate in the Pittsburgh, Pa., district, and excepting for a day or two during the past month, when storms have made traffic impossible, the river fleets have been engaging under heavy distribution. There is a satisfactory call for material, both wholesaler and dealer accounts, for immediate and future deliveries, with every indication of a growing volume of business as the fall season matures.

The leading producers are keeping their diggers active at the different established pools, and are also busy at the docks, handling the incoming loads of material. Some of the stock is finding its way to storage, but the bulk of current output is for current sales. Large working forces are being employed at a number of the plants, with quotas close to a normal level.

Repair work is being carried out at a lively pace at the different local yards, with construction, as well, of several new vessels and scows to be placed on the local rivers in the near future. Local machinery dealers handling the marine supplies report a good demand from the river fleets and this is one of the bright spots of the trade at the present time.

Market quotations hold quite uniform and present figures are expected to continue without appreciable change. In the case of best washed river sand, a price of $1.00 is quoted for barge delivery at the diggers, with an increase of 10 cents per ton per pool. At plants, the material is quoted at $1.25 per ton, f. o. b. hoists; while loaded aboard trucks at company plant, a rate of $1.40 a ton is asked. Local supply dealers receive a discount from these figures, ranging to about 10 per cent.

Good washed gravel is now being quoted at 65 cents a ton at the diggers, and similar increase of 10 cents a ton per pool. At plant hoist in carload lots, the figure is 85 cents per ton, while for loaded gravel on trucks at plant, the quotation runs to $1.10 per ton.

Portland cement is selling at $2.19 a barrel to dealers and contractors, without bags, and is enjoying a fair call. Building supply yards are giving quotations of about $3.00, delivered, with regular bag rebate. Crushed stone is priced in the wholesale market at $2.85 a cubic yard, both 1½ and ¾-inch sizes.

The recent report of the local federal engineers covering traffic on the rivers during May, shows the Ohio River first in the line of sand and gravel in this territory; measured in short tons, the figures for this stream are sand, 143,875, and gravel, 108,677. The Monongahela River had a total tonnage in this period of sand, 110,255, and gravel, 80,800. The figures for the Allegheny River are sand, 108,155, and gravel, 105,442. tons.

J. K. Davison & Brothers are operating under a good capacity and turning large stocks of sand and gravel from their diggers. The company will continue on the present basis without interruption. Repairs have recently been made to the electric-operated dredge, "Allegheny," of the company, following an accident to the main shaft which disabled the unit. Work has also been in progress on the steamer, "Elizabeth Smith," of the company's fleet, including a new emergency shaft and other equipment.

The Rodgers Sand Co., is not only maintaining its activities on the river but engaging in dredging and other work for private account. The company's diggers are running at regular capacity and heavy barge loads are being brought to the local port. Work has been under way on the dredging of a harbor at the Colonial docks of the H. C. Frick Coke Co., at a place heretofore known as the Alice Mines, Monongahela River.

The Iron City Sand Co., has been having a landing dredged at Renouf's Beach, near Pittsburgh, for proposed increased activities in this section. As in the case of other leading interests, the company is running its diggers and river fleet at a good rate of production.

The McMyler Interstate Co. announces the opening of a San Francisco office at 615 Monadnock Building, with C. F. Wolfradt in charge. Also the opening of a new branch at 619 Genesee Building, Buffalo, N. Y.

Portland Cement Output in June 1924

The statistics shown in the following tables issued by the Department of the Interior, and prepared under the direction of Ernest F. Buchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for June, 1924, were made necessary by the lack of returns from two plants.

Shipments for the month are the greatest on record, production is exceeded only by that of May, and stocks are over 62 per cent higher than in June, 1923.

Production, shipments, and stocks of finished portland cement by districts in June, 1923 and 1924.

Commercial District	Production, June		Shipments, June	
	1923	1924	1923	1923
Eastern Pa., N. J., and Md.	3,155,000	3,301,000	3,415,000	3,945,000
New York	648,000	696,000	676,000	906,000
Ohio, Western Pa. and W. Va.	1,263,000	1,282,000	1,359,000	1,526,000
Michigan	747,000	899,000	863,000	1,093,000
Wis., Ill., Ind. and Ky.	1,867,000	2,044,000	2,093,000	2,209,000
Va., Tenn. Ala. and Ga.	647,000	939,000	663,000	956,000
Eastern Mo., Ia. and Minn.	1,224,000	1,444,000	1,447,000	1,524,000
Western Mo., Neb., Kan. and Okla.	866,000	939,000	768,000	840,000
Texas	334,000	390,000	368,000	401,000
Colo. and Utah	276,000	279,000	276,000	275,000
California	1,021,000	992,000	1,000,000	1,010,000
Ore., Wash. and Mont.	334,000	333,000	379,000	351,000
	12,382,000	13,538,000	13,307,000	15,036,000

Production, and shipments of finished portland cement, by months, in 1923 and 1924 in barrels.

Month	Production		Shipments		Stocks at end of month	
	1923	1924	1923	1924	1923a	1924
January	7,990,000	8,788,000	a5,628,000	5,210,000	11,477,000	a14,155,000
February	8,210,000	8,588,000	a6,090,000	5,933,000	13,596,000	a16,815,000
March	9,880,000	10,370,000	10,326,000	8,995,000	13,045,000	a18,189,000
First quarter	26,080,000	27,746,000	22,044,000	20,138,000	.....	.....
April	11,359,000	11,726,000	12,954,000	12,771,000	11,463,000	a17,159,000
May	12,910,000	13,777,000	14,257,000	14,551,000	10,144,000	a16,403,000
June	12,382,000	13,538,000	13,307,000	15,036,000	9,168,000	14,905,000
Second quarter	36,651,000	39,041,000	40,518,000	42,358,000	.....	.....
July	12,620,000	.....	13,712,000	.....	8,081,000	.....
August	12,967,000	.....	14,971,000	.....	6,080,000	.....
September	13,109,000	.....	13,698,000	.....	5,533,000	.....
Third quarter	38,696,000	.....	42,381,000	.....	.....	.....
October	13,350,000	.....	14,285,000	.....	4,612,000	.....
November	12,603,000	.....	10,251,000	.....	6,991,000	.....
December	9,997,000	.....	6,408,000	.....	10,900,370	.....
Fourth quarter	35,950,000	.....	30,944,000	.....	.....	.....
Preliminary total	137,377,000	.....	135,887,000	.....	.....	.....
Amount of under estimate	83,238	.....	25,118	.....	.....	.....
Final total	137,460,238	.....	135,912,118	.....	.....	.....

a Revised.

Eastern capitalists are said to have been negotiating with business men of Gaffney, S. C., for some months with a view to establishing at Gaffney a $3,000,000 plant for the manufacture of cement in large quantities. Recently an assayist came to Gaffney and examined the ground. Although his statements were not very favorable, indicating that the lime deposits are not large enough to warrant such a plant, C. D. Meadows, one of the men interested, is still hopeful that the plant will be built.

Cement Industry Maintains Strong Position

Road Construction Absorbs Heavy Tonnage—Mills Stocking for Heavy Fall Demand.

By Our Special Correspondent

CEMENT mills in the Lehigh Valley section of Pennsylvania continue active and incoming call both for current and future accounts holds quite satisfactory. The heavy construction work in the eastern districts, at New York and different New England points, is assisting materially in keeping up the sales at the mills and hundreds of tons of material are being shipped to such destinations. The outlook indicates that there will be no let-up in this quarter for some time to come.

Road construction, also, is another feature of the situation that is encouraging, and the states of Pennsylvania, New Jersey and New York are absorbing a heavy tonnage of cement from this district. While the time for letting contracts for new roads is passing for the moment, current awards represent millions of dollars and contractors are placing their orders for requirements to insure supply when needed.

A number of the mills have been making an effort to stock up in anticipation of heavy fall call, and a part of present production has been finding its way to the stock houses during the past month. No concern is expressed in this connection with regard to price maintenance, it being held that existing levels are about as low as can be made under present operating costs, with reasonable margin of profits.

The labor situation continues quite satisfactory and all quotas are filled at the different leading mills in this district; some of the bagging plants have been running on an increased schedule to keep up with the call, and this has led to greater employment. The quarries, also, are quite active, with regular working forces turning out limestone for the mills from day to day.

The easing of freight in other lines of industry has made possible all necessary cars for shipments from the plants and several companies are taking advantage of the situation in moving stocks in sizable quantities to warehouses in the main consuming districts. The use of motor trucks for this service continues active.

A matter of rather current moment is the increasing quantity of foreign cement which is reaching seaports on the North Atlantic Coast and finding satisfactory distribution in the main consuming sections in this district, New York, Boston and other cities. It is stated that the gross shipments for the present year from Antwerp alone will approximate 30,000 tons, while other places on the Continent are similarly active in exports of the material to the United States. Quite naturally, this will affect sales at the eastern mills, and in anticipation of what may be ahead, manufacturers have appealed to the Treasury Department to apply the anti-dumping law to this foreign commodity. Importers are fighting the action, maintaining that the gross imports represent only a small percentage of the domestic production.

Practically all of the Lehigh Valley mills are keeping production on the established basis, including the large plant of the Atlas Portland Cement Co., at Northampton; Lehigh Portland Cement Co., West Coplay, Fogelsville and Mill No. 3 at Omrod; Coplay Cement Mfg. Co., Coplay; Nazareth Cement Co., Nazareth; Phoenix Portland Cement Co., Nazareth; and the Pennsylvania Cement Co., and the Bath Portland Cement Co., both with mills at Bath. The Alpha Portland Cement Co. is active at its different plants.

The established mill base of $1.95 per barrel in carload lots, without bags, holds firm in the Lehigh Valley district, and this price, incidentally, is the lowest of any of the plants in the country, being duplicated only by a few of the other producing districts. The Universal Portland Cement Co. is selling on the same base of $1.95 at its mills at Universal, Pa., in the western part of the state, while mills at Hudson, N. Y., and vicinity are operating on a $2.05 rate. This last noted figure is the same as prevailing in the Virginia section, at Fordwick.

Members of the Allentown, Pa., Chapter, American Association of Engineers, were guests recently at the plants of the Giant Portland Cement Co., at Egypt, and of the Bath Portland Cement Co., at Bath. The visitors made a tour of inspection at both plants, giving particular attention to the efficient crushing works of the Giant company, and to the econom-

ical waste heat boilers at the Bath mill. D. C. Finley, engineer at the Giant mill, acted as host to the party at this plant with James Gish, engineer at the Bath plant, engaged similarly for his company.

The International Cement Corporation, 342 Madison Avenue, New York, is perfecting plans for the early erection of its proposed new mill in the vicinity of Norfolk, Va., where property recently was acquired. The plant will be built and operated by the Virginia Portland Cement Co., a subsidiary organization, with offices in the National Bank of Commerce Building, Norfolk. The mill will consist of a number of buildings, with power house, laboratory and other departments, and is estimated to cost in excess of $1,000,000, with equipment. The company has raw material deposits on the James River, and purposes to install equipment for development and operation here.

The Clinchfield Portland Cement Co., Kingsport, Tenn., has commenced placing equipment orders for its new local mill, now in course of erection, and has given a contract to the General Electric Co., Schenectady, N. Y., for machinery for the power plant. The installation will consist of two turbo-generators and auxiliary equipment, with switchboard, etc. Award has also been made to the same company for more than 50 induction motors of various sizes, with largest of 300 and 500 h.p. rating.

The Peerless Portland Cement Co., First National Bank Building, Detroit, Mich., has awarded a general contract to H. L. Vanderhorst, Kalamazoo, Mich., for the erection of several buildings at its new local cement mill, on which work will be placed in progress at once. Contract has been let for a portion of the machinery and other orders will be placed at an early date. The entire plant will cost in excess of $1,500,000. A. F. Miller is company engineer, in charge. Albert Kahn, Marquette Building, Detroit, is architect.

The Pacific Portland Cement Co., Consolidated, Pacific Building, San Francisco, Cal., has taken over the properties of the Imperial Gypsum Co., near El Centro, Imperial Valley section, Cal., and plans for extensive operations on this tract. Machinery will be installed for development work and the erection of a new mill is under consideration. The work is estimated to cost close to $350,000.

Eastern Situation Improves, Construction Active

A Marked Rebound in Activities Evident—Labor and Prices Remain Fairly Stable

By Our Eastern Correspondent

CONSTRUCTION at New York and other eastern centers is being maintained at an encouraging rate for this season of the year and there has been a marked rebound in activities during the past 30 days. The improved situation and attitude have brought increasing interest in the sand, gravel and crushed stone markets, with producers and dealers feeling the benefits of the advancing trade.

With June building contracts reaching a total of about $91,500,000, in the New York and New Jersey districts, an increase of approximately 8 per cent over the corresponding month of a year ago, the month of July bids fair to equal, if not exceed this record. The bulk of current work is found in dwellings, designed for one and two families, while apartment construction still shows a perceptible lag. Commercial buildings are coming along at a better rate and assisting materially in swelling the average, with industrial structures and factories playing a close second in advancing totals.

The labor situation holds fair, except in the case of the local structural iron workers, who are still out on strike. This has held up a number of important projects. The stone cutters have succeeded in their demands for a wage increase, and commencing July 1st, the men are now receiving $11 a day. Laborers are getting 93 cents an hour and slightly better in the local construction industries. Plasterers are rated at $1.50 an hour, the highest wage prevailing, while marble setters and other affiliated crafts are receiving from $1.25 to $1.31 an hour.

Labor for sand pits and rock quarries is readily available, although good men are always at a premium and have no difficulty in securing jobs. While the volume of employment in this line has fallen a little, the majority of the producers in the Cow Bay district, as well as New Jersey sections, are giving work close to normal quotas. It is expected that there will be an advancing call for

men as the fall season matures.

The Raritan River section of New Jersey shows an inclination to increase its sand tonnage, and outputs are now rebounding too close to a normal level for this season of the year. There is a growing call for material and several producers are booking some good fall business.

There is a strong tendency in the New York market to maintain present price levels, and the past month has shown no marked change in the line of basic commodities. A feature of the present situation is the increase in orders from the local building material dealers, reflecting the better volume of trade which is now coming their way.

Crushed stone is selling at $1.75 and $1.85 a cubic yard in wholesale quantities, 1½ and ¾ inch sizes, and is in good demand by contractors and dealers at these figures. The last noted are asking $3.25 for the material, delivered on the job.

Washed gravel is being wholesaled at $1.75 per cubic yard, 1½ and ¾ inch stocks, a reduction of 50 cents over the prevailing quotations at this time a year ago. New York deals are listing the material at $2.75 a cubic yard, both sizes, site deliveries within the different established zones.

Sand holds at the recently established level of $1.00 per cubic yard in cargo shipments, a reduction of 25 cents over the level of July a year ago. Building supply yards are selling at $2.00 a cubic yard for delivered material, while sharp white sand is being retailed at $4.50 on the job.

Quarry stone is moving at a better rate, with advance business indicating a rapid revival. Indiana limestone is quoted at the local building supply yards at $1.65 to $1.68 a cubic ft.; Kentucky limestone is at $1.90 and $1.95. Sandstone from the different producing districts is at $1.60 and $1.70 per cubic ft.

Portland cement continues to operate under a good call, with dealers and contractors paying $2.15 for dock deliveries, and from $2.50 to $2.60 for yard shipments. The retail level shows no change from $3.00, with usual bag rebate.

Dealers at New York are quoting finishing lime in standard 300 pound barrels at $4.50 a barrel, delivered; common lime, same size container, $3.75, while hydrate finishing is selling at $24.00 a ton retail. At the warehouse, to contractors and dealers, common lime is selling at $3.05 to $3.25 a barrel, and hydrate finishing, from $18.20 to $18.25 a ton.

Crushed stone in the Boston, Mass., market, typical of this section of New England, is being turned at $2.50 a ton, retail, by local dealers, while the wholesale level stands at $1.45. In the case of sand, the price has declined from $1.20 to $1.00 a cubic yard, wholesale, while consumers are paying at the rate of $2.50 per ton, delivered. Clean beach sand is selling for $5.00 a ton, retail. Portland cement in this section holds at $3.60 per barrel in small orders to $3.45 in truckloads, delivered on the job. Dealers and contractors are being asked $2.63 per barrel, cargo lots. Hydrate finishing lime in paper is selling at $25.00 a ton in this market, while hydrate common stands at $20.00 delivered. At the warehouse, the wholesale level of hydrate finishing is at $20.00 a ton, while hydrate common is at $15.00 per ton.

Building supply interests at Philadelphia, Pa., report an increasing volume of trade in the line of Portland cement, lime, sand and other basic materials. The price situation in this district remains uniform and it is likely that present levels will continue for some time to come. Sand is selling wholesale at $1.50 per cubic yard, and gravel at $2.10 a cubic yard. Portland cement is around $2.40 a barrel wholesale from the Lehigh district mills. There is a considerable amount of road improvement work now going forward in this vicinity, and a feature of current wholesale account is the volume of materials being absorbed for this construction.

There is good activity in the Buffalo, N. Y., district for this season of the year, and the leading sand and gravel interests are turning production to satisfactory account. Among these, the Buffalo Gravel Corporation is busy at its different yards at the foot of Austin Street, foot of Bird Avenue and on Hudson Street. The Seneca Washed Gravel Corporation is another active concern. The local stone market is also improving, while the call for Portland cement continues quite active.

The Charles Warner Co., Wilmington, Delaware, has completed the installation of a new hydrating plant at its Cedar Hollow lime plant, and expects to use the extension immediately. It has a rated output of 20 tons per hour.

Pan-American Confederation for Highway Education Formed

By Our Washington Correspondent

HAVING completed organization of a Pan-American body for the promotion of highway education in the various countries composing the Pan-American Union, delegates to the Pan-American Highway Commission are enroute to their countries with a definite goal in their minds, based on observations of United States methods of highway construction obtained on a 4,000-mile tour through ten states. Their objective can best be stated in the words set forth in the constitution of the Pan-American Confederation for Highway Education, formation of which marked the close of the series of conferences in Washington; "To study and promulgate in the different countries constituting the Pan-American Union fundamental principles that contribute to the development of adequate highways."

The delegates, representing nineteen Latin American nations, are taking with them a multitude of ideas and trunkfuls of data with which to get out towards the educational goal marked out for them. They already, in fact, are launching the first big step in the desired direction by mapping out plans for the inauguration of annual pan-American highway congresses, the initial one of which will be held early next year at Buenos Aires. During the extensive tour of road inspection, on which the twenty-seven delegates were accompanied by a committee of guides and hosts, the party inspected highways in Kentucky, North Carolina, Ohio, New York, Pennsylvania, New Jersey, Minnesota, Illinois, Michigan and Wisconsin. About 2,000 miles were covered in automobiles, enabling the delegates to obtain a first-hand view of and to give a thorough test to the thoroughfare being studied. All along the route the party was cordially entertained by State, county and city officials and citizens.

The month-long trip of inspection, which was arranged by the Highway Education Board, under the supervision of a committee headed by Roy D. Chapin and consisting, in addition, of Fred I. Kent and W. A. Beatty, was directed throughout by S. T. Henry, an experienced hand at Latin American Affairs. Interest of the delegates seemed to center on gravel and clay roads of the type to be dealt with in their own countries. The delegates realized that the first forward step must not be too long to imperil future progress. Improvements to the so-called low type gravel and clay roads would eventually lead to a demand for better construction along hard-surface lines, it was pointed out. The delegates also spent considerable time studying methods employed in the United States at the universities in training engineers to pave the way for modernized transportation facilities. Leading educational institutions were visited for this purpose.

With the signing of the Agricultural appropriation bill by the President, June 5, $6,000,000 was appropriated and $4,000,000 authorized for the construction of forest roads and trails. Of the $6,000,000, $3,500,000 had previously been authorized for the fiscal year 1924. Of the remaining $2,500,000 appropriation, half is forest-highway money which will be spent upon roads of primary importance to the counties and States. The remaining half is known as forest-development money and will be expended on roads the greatest importance of which are for use in the development and protection from fire of the national forests. Of the authorized amount $2,250,000 is forest highway and $1,750,000 forest development.

The Specialty Fordson Loader

A bulletin has been issued by the Specialty Engineering Company of Philadelphia describing their heavy duty loader mounted on, propelled and operated by a Fordson Tractor. This "Specialty Fordson Loader" is portable and it utilizes the tractor as its power plant. This loader consists essentially of three parts —the chain and bucket elevator, the conveyor boom and the supporting frame.

The frame which carries the chain and bucket elevator is built of structural steel and is mounted on the rear axle. The buckets are attached to two high carbon steel endless chains. On the ends of the buckets are rollers which travel on steel tracks up the height of the elevator. These rollers which support the buckets and chain are an individual feature of the loader. The conveyor boom mechanism which moves the material forward beyond the front end of the tractor is the endless belt conveyor type.

This machine is rugged in design and has ample capacity and power for hard continuous service. It is especially economical for loading sand, gravel and other loose materials from the ground or from drop bottom cars into wagons or trucks.

New Incorporations

The Acme Silica Sand Co. of Massilon, Ohio was incorporated for $50,000 by W. R. Layne, Jerome F. Welch, Reuben Carman, and Dessie L. Wolgamott.

The capital of the Atlantic Marble Co., of Brooklyn, N. Y. was increased from $12,500 to $50,000.

Addison Rock Products Corp of Manhattan, N. Y. was capitalized at $250,000 by Mr. Wm. Rockwell, of Jamaica, N. Y.

The Castalia Marl Lime Co. of Canton, Ohio, was incorporated at $20,000 by L. C. Zollars, C. R. Hostetler, Mollie Hostetler, Arma Hostetler, and Mabel V. Hostetler.

The Cleghorn-Bemis Agricultural Lime Co. of Highland, California, was incorporated with a capital of $500,000.

The Cleveland Marble Mossaic Co. of Cleveland, Ohio, was incorporated by Della Bianca and A. Mion, with capital of $10,000.

The Colorado Yule Marble Co. was incorporated by A. J. Mitchell, W. J. Fine, and R. P. Jones; 25,000 shares, no par value.

The Elkins Granite & Power Co. was organized to develop the granite quarry on the farm of J. B. Parks at Elkin, N. C. with capital of $100,000.

The Fidelity Construction Corp. at Portland, Maine, was organized with capital of $10,000 by Frederick D. Collins, G. L. Burke, and Arthur D. Welch of Portland.

The Halleck Sand & Gravel Co., Inc., has incorporated for $200,000 by H. H. Halleck, C. G. Hill and C. M. Edwards of Malden, and E. E. McConnell of Bloomfield.

The Harnette Sand & Gravel Co., Inc., has capitalized at $25,000, at Fayetteville, N. C.

The Monterey Sand & Gravel Co. at Monterey, Calif., with $300,000 capital stock.

The Norvalt Corporation was formed with $180,000, by T. L. Croteau, of Wilmington, Delaware.

The Pratt Dark Barre Quarry Co., Inc., are taking over the quarry business of the Williamstown Quarry Co., with capital of $100,000. The principal office will be located at Barre, Vermont. The incorporators are Thos. J. Pratt, John C. Booth, Samuel McCreadia, Alex McPherson, Joseph Ross and Ernest H. Bailey.

Richmond Sand & Gravel Corp. of Petersburg, Va., was incorporated by B. F. Francis, H. E. Vaughan, J. H. Lavenstein—all of Petersburg; capital stock $35,000 to $150,000.

The Virginia Lime & Stone Co., Wiilmington, Del., was incorporated May 3 for $100,000. (F. L. Mettler, Wilmington.)

The Fairmont Stone Quarries, Inc., Wilmington, Del., was incorporated May 3 for $200,000 to mine soapstone and granite.

The Pidgeon & Orr Company, New York City, was incorporated May 12 to manufacture cement products, with 100 shares of common stock, no par value. Incorporators are F. K. Pidgeon, S. J. Orr, W. P. Haskell. (Attorneys, H. & C. E. Heydt, 2 Rector St.)

The Snake River Gypsum Co., of Boise, Idaho, was incorporated on May 8 for $400,000, with $250,000 shares of no par value. The incorporators are H. G. Myers, P. H. Miller, W. S. Titus, Russell M. Ash and W. G. Ash.

Mente and Company of New Orleans, manufacturer of burlaps and bags, have reorganized their personnel as follows: I. T. Rhea, President and General Manager; J. C. Mente, Vice President and Treasurer; F. O. Reinecke, Secretary. Directors are: I. T. Rhea; E. W. Mente; J. C. Mente; Harold Danziger, Sales Manager; F. O. Reinecke; P. J. Forstall.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,498,659. Impact gravel-testing apparatus. Frank H. Jackson, Washington, D. C.

1,498,987. Loader. Harry H. Barber, Aurora, Ill., assignor to Barber-Greene Co., same place.

1,499,426. Sand cutting and screening machine. John S. Townsend, Harvey, Ill., assignor to Whiting Corporation, same place.

1,499,455. Impeller for rock-crushers. Alvah D. Hadsel, San Francisco, Cal.

1,499,892. Separator. Thomas J. Sturtevant, Wellesley, and Edward A. Sawyer, Swampscott, Mass., assignors to Sturtevant Mill Co., Boston, Mass.

1,500,411. Tunneling machine. Guttorm Miller, Glens Falls, N. Y.

1,500,415. Shaking-screen. Frank C. Morrow, Wellston, Ohio.

1,500,783. Crane mechanism. Charles A. Weber, Lorain, Ohio, assignor to Thew Shovel Co., same place.

1,500,856. Vibrating screen. Timothy D. Walsh, Los Angeles, Cal.

Fuller's Earth in 1923

The largest output on record of fuller's earth is reported by the Department of the Interior, through the Geological Survey working in cooperation with the State Surveys in Alabama, Florida, Georgia, and Illinois, 15 operators in 6 states reported that 149,134 short tons of fuller's earth were sold in 1923, valued at $2,247,523, or $15.07 a ton. This output is 7 per cent greater than that of 1922, but it is nearly four times the output of 1913. The value of the output for 1923 was the third largest that has ever been recorded, and was exceeded by that of 1920 and 1922. It was six times as large as that of 1913. Since 1920 there has been a steady decline in the average price per ton, the price in 1923 being nearly $4.50 lower than that of 1920. The South continues to produce the greater part of the output. Florida was the leading State in output and value, as it has been from the beginning of the industry. Georgia was second and Texas was third in output and value.

An Economical "Primm" Installation

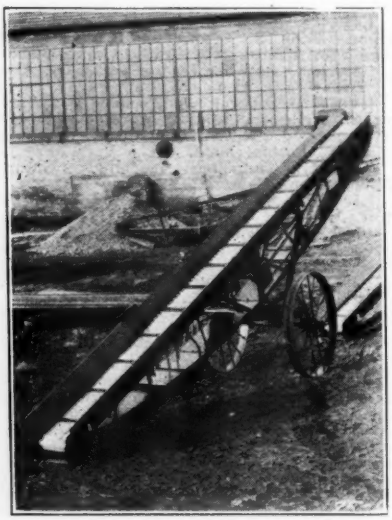
The Willey-Ruecksthul Plant at Cincinnati, Ohio, one of the up to date plants in the Middle West, is operated by a 150 H.P. "PRIMM" Oil Engine driving an Electric Generator furnishing current for the various motors totaling 205 H.P. The capacity of the plant is 2 car loads of material per hour of crushed rock, and sand and gravel which is made in eight grades.

The entire plant is operated by five men including the superintendent. The "PRIMM" engine is looked after about four times a day—the power cost runs about 1¼c per ton of material and the upkeep on the engine has been about $2.00 per month during the three years that it has been in use. During one entire season but one shut-down was necessary due to engine trouble.

Last year this plant turned out 67,000 tons of material and used approximately 15,000 gallons of fuel oil at a cost of 5¼c per gallon delivered.

The Barber Greene Conveyor

The Barber Greene Company of Aurora, Ill. have had their Types N, O, and V conveyors approved by the Underwriters Laboratories. The type O conveyor is similar to the type N except that the type O has a cleated belt. These conveyors are electrically operated and portable. They have been designed for loading and conveying materials such as sand and gravel. They are manufactured in 15 to 60 foot sizes and are equipped with 2 to 8 h.p. motors with the necessary control apparatus.



Type "U" Conveyor.

Spur Gear Speed Transformer

The Hill Clutch Machine & Foundry Company, Cleveland, Ohio, have developed the "Industrial Type" Spur Gear Speed Transformer, realizing the urgent need for an efficient and durable speed changing device for such service as is encountered in connection with conveyor drives, in pulp and paper mills, mines, smelters, steel plants, refineries, cement mills, brick plants, and in fact for all general industrial work where speed transformer units are operated under continuous or heavy service conditions; in other words, something substantial to meet the every day rough usage of mill operation.

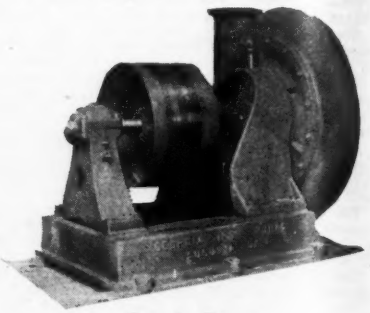
The "Industrial Type" Speed Transformer consists of a nest of plain spur gears revolving in oil, changing the revolutions per minute of the input shaft to some desired revolutions per minute of the output shaft. The power transmitted is the same in both shafts. The efficiency is higher than any other form of gearing. The gears all have 20° involute form cut teeth. The short length of these teeth combined with their powerful cross section insures great strength and reliability.

New Chain Publications

The Morse Chain Company of Ithaca, New York, have issued two new publications entitled a Chain of Testimonials and a Chain of Evidence. These bulletins are especially well illustrated with actual installations of the Morse Chain. An excellent table on the data to be used in the design of Morse Silent Chain Drives is included in the bulletin entitled A Chain of Evidence.

Georgia Iron Works

Centrifugal sand and dredging pumps, hydraulic guns, flanged pipe fittings, and a complete line of screening and washing machinery, are manufactured by the Georgia Iron Works of Augusta, Georgia. This equipment is fully illustrated and treated in their catalog with the exception of the screening and washing machinery. The requirements of washing and screening equipment are more or less special in each case and the Georgia Iron Works treats these problems direct. Capacities and specifications are given for each type of pump. The Climax Hydraulic Gun is also fully treated.



Georgia Pump.

New Oxweld Catalog

A new 48 page catalog has been issued by the Oxweld-Acetylene Company. This catalog illustrates and describes in detail the complete line of Oxweld acetylene generators and Oxweld welding and cutting apparatus and supplies. It is replete with information of value to welders. This concern also publishes a monthly magazine entitled "Oxy-Acetylene Tips." Many of the articles in this paper are of much interest to the producer in the pit and quarry field.

Manganese Steel Sheets

The Manganese Steel Forge Company manufactures ROL-MAN Manganese Steel sheets and plates from 1/16" thick up to and including ¼" with a manganese content of 11 to 14% and Carbon 1.00 to 1.30. These sheets are out, punched and rolled to the usual pipe diameters and fabricated into dredge, pontoon or land pipe into any lengths desired. The ends can be furnished with cast or wrought flanges, riveted or welded on, or made with slip joint ends with two or four hooks on each end for securing the sections together. ROL-MAN Steel has a high abrasive resistance, and when fabricated into pipe, gives high abrasive resistance and long life with light weight. This is an important factor in pontoon and land pipe.

The "Locomotive" GMC Truck

General Motors Truck Co. reports a GMC truck enacting the rôle of the prize "locomotive" of the Compagnie de Chemin de Fer de Plaine de Cul de Sac, on the island of Haiti, both for freight and passenger business. The locomotive has a GMC engine, and GMC transmission and differential. In this illustration it is hauling 16 cane cars.

Austin Portable Belt Conveyors

A new addition to the list of portable belt conveyors on the market is the Austin Portable Belt Conveyor. These are made with either gas engine drive or electric motor drive, and mounted on wheels pivoted to permit swinging the conveyor in a semi-circle around the dropper.

Austin portable conveyors are supplied in any desired length between 26 ft. and 74 ft., the multiple extensions being either 6 ft. or 12 ft. long. A two-wheel truck is supplied with the shorter conveyors and a four-wheel truck with the longer lengths. The gas engine is mounted on the truck, the electric motor drive is tightly housed within the conveyor frame, protected from the elements and accidents. The 4-ply belt has a rubber cover on the carrying side and runs on a series of triple, trough rollers. These conveyors are especially designed for handling gravel or stone, sand, earth or clay.

Mundy Hoisting Equipment

The J. S. Mundy Hoisting Engine Company of Newark, New Jersey, have issued the seventeenth edition of their general catalog covering steam, electric and gasoline hoisting equipment, mining dredging and logging engines, marine auxiliaries, derricks, cableways and pipe drivers. The catalog is profusely illustrated with installations. A complete description with specifications is given for each type of equipment. Some interesting pointers on operating methods are also included.

Diesel Shovel and Dragline Excavator

A further addition to its line of Diesel shovels and dragline excavators has recently been announced by the Bucyrus Company. This machine, which is the largest of its three small revolving machines, is known as the 50-B. In dipper capacities and working ranges this machine is similar to its 50-B steam shovel and dragline. As a shovel it carries a 1¾ yard dipper, and may be had with standard high-lift or extra high-lift booms thus adapting it to a very broad range of digging conditions. As a dragline it may be had with a variety of boom and bucket combinations, ranging from a 45-foot boom with a 1½-yard bucket to a 60-foot boom with a ¾-yard bucket. As is the case with the steam machine, it may also be had with crane or clamshell bucket equipment.

The engine has no carburetor or ignition system. Its power characteristics are very similar to that of the steam engine which for many years has been considered the ideal power unit for a steam shovel or a dragline excavator. The 50-B is powered with a mechanical injection, four-cycle, four-cylinder, slow-speed, heavy-duty 9x12 engine, running at a conservative speed of 300 R.P.M. This engine was developed particularly for excavating service and is especially rugged, has large bearings, extra heavy crank shaft and connecting rods, and extra heavy flywheel and rigid base. It is felt that this machine will supply a long-felt want for many types of excavation.

The Speciality Engineering Company of Philadelphia, Pa., have opened an office in Chicago, in charge of A. Prausnitz, 1052 Peoples Gas Building.

New Pump Unit

The Domestic Engine and Pump Company of Shippensburg, Pennsylvania, have developed a new Double Acting Trench Force Pump Unit. This equipment has a wide variation of uses, and will handle water containing a large percentage of foreign matter such as is found in trenches, manholes, sewers, quarries, mines, etc. This pump was designed to meet

New Domestic Unit.

the demand for a pump of large capacity that will handle dirty water and discharge it through pipe or hose lines to suitable places for disposal. The pump has the maximum capacity with a minimum of bulk and weight and it will discharge to high levels or through long horizontal lines without sloppage around the pump. It is especially suited for pumping out flooded foundations, boat bilges, excavations, etc.

Magnetic Pulleys and Separators

A new bulletin covering "High Duty" magnetic pulleys and separators has been issued by the Magnetic Manufacturing Company of Milwaukee, Wis. This bulletin is well illustrated and interestingly prepared. Specifications and capacities for the pulleys and separators are also given. Magnetic pulleys considered a novelty ten years ago, are today recognized as essential and are used extensively for removing iron and steel in any form. In crushing, grinding and pulverizing plants they are a necessity in the removal of any "Tramp Iron" that may have entered the material thus protecting the apparatus against injury.

Chisholm-Moore Electric Hoist

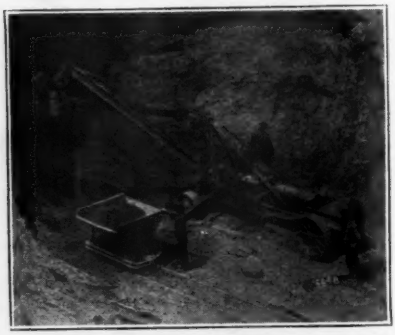
The Chisholm-Moore Manufacturing Company of Cleveland, Ohio, are now manufacturing an electric hoist which is completely described in a new 12 page bulletin. This new electric hoist has been designated the "C-M." It is designed on the principle of the fewest possible parts to get out of order and those can be fixed if they do. By simply removing six bolts conveniently placed, the entire hoisting mechanism can be pulled out—drum, cable gears and all. The bulletin tells the complete story of the unusual features of this hoist.

The Kearns Silica Sand Co., Oak Hill, Ohio, was incorporated May 8 for $10,000 by Charles Moreland and A. B. Arganbright.

The Insley Excavator

The Insley Excavator was introduced to the market the first of the current year, and since that time a number of these machines have been put into successful operation in sand and gravel pits. They are used for stripping and working in banks.

There are several instances in which the machine has handled an average of four hundred yards of material a day from the time it was put into service until the present, which is creditable performance. This machine requires only one man to operate, and the consumption of fuel is low with the result that operating costs are low. It can be moved readily from one job to another under its own power.



Insley In Action.

Osgood Add Continuous Tread

The Osgood Company, Marion, Ohio, has recently added continuous tread equipment to its line of mountings for standard shovels, supplementing the railroad truck and traction mountings.

The continuous tread mountings are made for shovels of dipper capacities ranging from 1½ to 6-cubic yards; can be easily put on in the field to replace other mountings and are easily removed when it is necessary to move the shovel by rail.

The new continuous tread mounting has much in common in the way of advantages with the heavy traction mounting introduced to the industry by The Osgood Company. These advantages are briefly that track and accessories are eliminated; the pit crew is dispensed with or greatly reduced; the shovel can be kept in the most effective digging position, can back away from blasting and can travel and work in water; and that the time required for changing locations is very greatly reduced.

The mounting consists of two continuous tread belt units carried on side brackets, replacing the jack arms at the forward end of the machine, and a narrow, double belt truck occupying the same position as the rear railroad truck. The side brackets are somewhat similar in shape to the jack arms used with the railroad mounting and occupy the same positon but are much heavier. They are very rigidly attached and braced.

New Universal Vibrating Screen Catalog

A very clear and concise description of Universal Vibrating Screens is given by the Universal Vibrating Screen Company, of Racine, Wisconsin, in their new 24-page Catalog No. 50, just off the press.

A New Ingersoll-Rand Air Compressor

A new portable air compressor, built "to answer the need for a smaller portable," for use on jobs too small for larger machines, is announced by the Ingersoll-Rand Company of New York City. This machine is designated the New 4½x4 Type Twenty gasoline engine driven Portable Compressor.

This Compressor is described as being compact and steady, with every part accessible, easy to operate and easy to move. It has a piston displacement of 60 cubic feet per minute and is built along the same lines as the larger Type Twenty Portables. All of the proven features of the larger units are retained, e.g., duplex, vertical compressor, direct-connected to a four-cylinder, four-cycle, tractors type gasoline engine; enclosed construction; circulating water cooling system for engine and compressor with sectionalized—radiator, fan, and pump; compressor regulator and engine control for reducing speed during unloaded periods; one-piece cast steel frame; sheet steel roof and removable side doors.

New Amsco Catalogs

The American Manganese Steel Company have recently issued five excellent catalogs. These catalogs are of the standard technical size, put up in serviceable folders in loose leaf style. The catalogs are entitled "Manganese Steel Castings," "Manganese Steel Castings for Quarries," "Manganese Steel Castings for Mines," "Manganese Steel Castings for Contractors," and "Manganese Steel Castings for Brick and Clay Plants."

All of the catalogs are well illustrated. The catalog "Manganese Steel Castings for Quarries," discusses the use of manganese castings for buckets, crushers, chain and buckets, crushers, chain and bucket elevator equipment, dippers, gear and pinions, pulverizers, screens, rail clamps, shovels and dredges, wheeels—in fact all quarry operation machinery. A very interesting treatment of manganese steel and how it is made is also included. Copies of these catalogs may be secured from the general offices at Chicago Heights, Illinois.

Milwaukee Locomotives

The Milwaukee Locomotive Manufacturing Company of Milwaukee, Wisconsin, have issued a catalog dealing with their Type H locomotives of 9 to 15 tons. These locomotives represent an economical method of transporting materials and supplies in and around quarries, pits and mills. This particular catalog describes the 9, 10, and 15 ton locomotives, although the company builds smaller sizes which are described in other catalogs.

The Automatic Weighing Machine Company, formerly of Newark, N. J., and with a New York office at 50 Church Street, has recently been taken over by the American Machine & Foundry Company, but will be operated under the name of the Automatic Weighing Machine Company. The office at 50 Church Street has been discontinued.

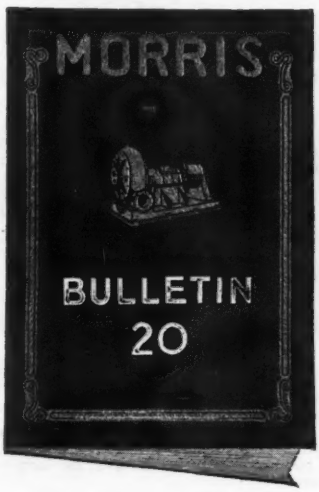
Clyde Lime Hydrator

Catalog No. 25 has been issued by H. Miscambell of Duluth, Minnesota, dealing with the use of the Clyde Hydrator in manufacturing limestone products. Miscambell have a complete line of lime equipment and this catalog treats of their processes. In the design of plants, it has always been their aim to include everything that is essential to successful operation.

Send for a copy of Bulletin 20

Morris Sand and Dredging Pumps

This bulletin explains and illustrates correct up-to-date pump construction and methods for sand and gravel production, hydraulic dredging and filling, and for all sorts of industrial handling needs.



Its pages also contain valuable erecting and operating hints and are filled with information of decided value.

Morris Pumps as shown, embody the designing judgment of America's first centrifugal pump builders and the experience gained from 60 years of successful pump performances. Service records of Morris Pumps throughout all these years entitle them to first consideration, so get your copy of this bulletin and keep it handy.

Morris Machine Works **Baldwinsville, N. Y.**

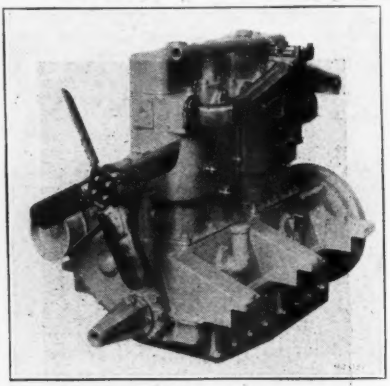
Originators of Centrifugal pumps, both single and multi-stage, and builders for practically all purposes since 1864

Branch offices: New York, 39-41 Cortlandt St.; Philadelphia, Forest Bldg.; Cleveland Engineers' Bldg.; Chicago, 217 N. Jefferson St.; Boston, 79 Milk St.; Pittsburgh, 320 Second Ave.; Detroit, Penobscot Bldg.; Charlotte, Realty Bldg.; Houston, 119 Main St. Sales Representatives: Buffalo, St. Paul, Kansas City, Denver, Salt Lake City, Seattle, Portland, Ore.; Los Angeles, New Orleans. Canadian Representatives: Storey Pump & Equipment Co., Toronto.

MORRIS
CENTRIFUGAL PUMPS

New Engine

The Beaver Manufacturing Company have developed a new type of heavy duty engine. This engine is made purposely large, has a 6 inch bore and 7 inch stroke, and weighs 2,000 pounds. It can be used to good advantage on cranes, to operate crushers and to



New Beaver Engine.

furnish a heavy duty power plant for sand pits and stone quarries. This engine is modeled after a 4 cylinder power plant unit which has proven successful for heavy duty service. This new model is made a trifle larger and stronger.

Industrial Works Notes

The Industrial Works announce the opening of a new district office at 455 Monadnock Bldg., San Francisco, California, in charge of Mr. J. M. McGuire, District Sales Manager. Mr. McGuire has been with the Industrial Works for twenty years as construction and erection engineer. His long experience especially fits him for service in connection with locomotive crane sales and installations.

Max Riebenack of Lansdowne, Pa., is now permanently connected with the Philadelphia branch office of the Industrial Works, Bay City, Mich., as District Sales Engineer. Mr. Riebenack was formerly Mechanical and Research Engineer with the National Aniline Chemical Company and the Industrial Separators Company, Philadelphia.

Ben W. Beyer, Jr., of New York, formerly Sales Engineer with the Union Special Machine Company, Chicago, is now with the New York branch office of the Industrial Works, Bay City, Mich., as District Sales Engineer.

Prospective users of air-lift water supply systems should be interested in the recent agreement entered into between the Indiana Pump Company, Indianapolis, Indiana, manufacturers of air-lift equipment, and the Chicago Pneumatic Tool Company, New York City, builders of air compressors, whereby each organization will use jointly, and exclusively, the products of each other on all their air-lift installations.

Morris Machine Works

Bulletin 122, issued by the Morris Machine Works of Baldwinsville, New York, discusses Morris-Double-Suction Pumps with horizontally split casings. The catalog is well illustrated and is easy and interesting reading.

New Sand Spreader

After several years of experiment and actual road tests under hard working conditions, the Reliance Chip and Sand Spreader has been brought out to meet the demand for Spreading equipment to take the place of hand labor, by the Universal Road Machinery Company.

This Spreader is used for placing a blotter coat of chips on sand oiled surfaces and will spread as much material as 10 or 12 men could by hand. It spreads with absolute evenness and the quantity of material can be regulated by means of the tail gate which is raised and lowered by a hand wheel operated from the driver's seat. It spreads to a width of eight feet the same as the ordinary oiler and a battery of two machines will cover as fast as the oil is applied.

The spreading unit operates in the reverse direction placing the cover ahead of the wheels so as to avoid running in the oil and the power, which can be a truck, roller or tractor, can be used to push the spreader or haul it on an offset as desired.

The unit was designed to be operated with a Fordson tractor which makes a very cheap and efficient power. When empty it handles with a draw pole exactly the same as any ordinary trailer.

It is fitted with solid rubber tires and springs and the wheels are furnished with roller bearings. The capacity of the body is 3 tons level full and will cover from 500 to 1,000 feet of roadway depending on the thickness of the material spread.

Full information and prices can be obtained from the Universal Road Machinery Co., Kingston, N. Y.

New Jeffrey Catalogue

The Jeffrey Manufacturing Company of Columbus, Ohio, have issued a new catalogue number 397 containing data of much importance. This catalogue shows the wide variety and application of Chains and attachments, Sprocket Wheels, Conveyors, Elevators, Pulverizers, Crushers, Lime Grinding Plants, Manganoid Balls and Linings for Tube Mill Service, Portable Loaders, Portable Bag Stackers, etc., as well as the complete service rendered by Jeffrey Engineers to the cement, stone and allied industries.

Explosives and Blasting Supplies

The Atlas Powder Company of Wilmington, Delaware, have issued a book that is really a test on explosives and blasting supplies. The book constitutes a rather complete treatment of explosives and their uses. An important section deals with cautions to be observed in the use of explosives. Another important section deals with the handling and storing of explosive supplies.

Plymouth Gasoline Locomotives

A series of bulletins and catalogues are available for distribution by the Fate-Root-Heath Company of Plymouth, Ohio, on gasoline locomotives. These bulletins are all illustrated with actual installations of Plymouth locomotives, and show evidence of a wide use of Plymouth locomotives in the pit and quarry field.

The Schaffer Engineering & Equipment Company of Pittsburgh, Pa., has changed its name to the Schaffer Poidometer Company. This change is due to the fact that they have discontinued their engineering department and are now confining their efforts chiefly to the manufacture of the poidometer and its appurtenances.